The Chemical Age

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Representation of the Chemical Profession

THERE are perhaps few subjects upon which there is a greater diversity of opinion among chemists than as to the body that should represent the interests of the profession. The two established bodies that claim this honour and responsibility have not that general backing that would be necessary before the profession can achieve a unity in any way comparable with that of medicine. In view of the energy with which this subject is debated, it seems strange that more attention has not been devoted to that passage in Professor Phillip's address to the Chemistry Section of the British Association wherein he recommended that positive steps should be taken to form " a corporate body to represent the common views and stand for the common interests of chemists as a whole." That the formation of a new body was suggested may be taken as evidence that Professor Phillip had his doubts about the possibility that existing associations and institutes could fill the bill. We have no intention of bringing down the wrath of Jove upon our heads by discussing the advantages or shortcomings of the existing bodies of chemists. It is sufficient to state here that the problem would be appreciably simplified if someone would lay down a definition to which all could agree as to what constituted a chemist.

The very diversity of the spheres of work with which chemistry is concerned causes the points of view and interests of chemists to vary widely. Professor Phillip rightly indicates the essential differences of opinion that must exist between the research chemist, the public analyst, the industrial laboratory chemist, and the man operating a process on the industrial scale. It is the failure to appreciate that these divergencies must exist in so far-flung a profession that has prevented any real success in finding a body that can represent the common views and stand for the common interests. The recent poisons legislation was an instance in point, when half the profession was satisfied because the regulations would include them, and cared nothing that many equally good men would be excluded because of certain misconceptions in the official mind. Professor Phillip used the phrase: " If for the moment we regard as 'trained chemists' all those who have taken an honours degree in science with chemistry as the principal subject . . ."; and there in a moment the battle is joined. One school will hold that Professor Phillip's definition of a chemist is all that could be desired. Another will greet it with howls of execration. Yet another will take the middle course of agreeing that a university degree is a good basis to work on provided that it is tempered with mercy for such as can prove equivalent qualifications academically or by virtue of experience. Until we resolve this fundamental difference of opinion, we shall make no headway.

Suppose, for example, a man adopts literature as a career; do we ask what degrees he has passed before we accept him as an author? Does the actor-manager ask for the degrees or qualifications of the author before reading a new play? He does not; he only asks that the play shall be good. The reader of a book only asks that the book shall be entertaining. So the chemist succeeds or fails by virtue of his work. The highest degrees are only of assistance in getting a post; they do not help a chemist to keep his post if his work be not satisfactory. On these counts we hold that those who would unduly stress academic qualifications, are wrong. By all means admit to the profession all who pass the honours degree, and all who with a pass degree enter chemical industry, but let that not be the only qualification. Professor Phillip indirectly recognised this when he spoke of " the works control of chemical processes, the examination of factory products, the safeguarding of the purity of food, and the supervision of water supplies and sanitation," as examples of other activities of a more routine character in which large numbers of chemists are engaged. These are, so to speak, the general practitioners of the chemical profession. The " general practitioners " of chemistry may not have that deep insight into the higher matters that is expected of the honours degree man, but he must know his job and he must do that job well.

Let us remember that all chemists are not called to the same work. It is not necessarily that the work of one is harder than that of another, but that it is different. The research men may well be in a class to themselves and to them we should apply the university qualification, whilst remembering that there are natural research geniuses and have been since scientific men first began to wrest from nature her secrets. It *might* be possible, if desirable (which we question), to grade chemists in this " corporate body " that Professor Phillip sees to be necessary, just as we have the Lords and Commons of the Realm. But at least let us remember that everyone who earns his living by using his brains in the practice of chemistry needs and asks for an organisation which will take care of his interests. It should be possible for chemists to compromise in their ideas so as to admit every practising chemist. It will be possible later to raise the standard after many years' warning so that the profession of chemistry will ultimately become closed and standardised like that of law, or medicine, or architecture, if found desirable. But in the name of sweet reasonableness cannot we proceed on these lines?

Notes and Comments

Verdict for Private Enterprise

PRIVATE enterprise versus State monopoly was, in effect, the issue submitted to the Royal Commission on the Private Manufacture of and Trading in Arms which commenced its deliberations eighteen months ago under the chairmanship of Sir John Eldon Bankes, and the report issued last Saturday was a unanimous verdict for private enterprise. No industry, save heavy engineering, is more vitally concerned with the production of war materials than the chemical industry, and the report is therefore of vital importance to our readers. When Sir Harry McGowan, chairman of Imperial Chemical Industries, gave evidence before the Commission in February, he emphatically declared that none of the evidence designed to show the practicability of the prohibition of the private manufacture of and trading in chemicals and explosives and the institution of a State monopoly showed any real understanding of the problems of the industry. He set out in detail the disadvantages that would arise from State monopoly, and advocated the appointment of a supervisory body which would, in short, be responsible for doing the work which in the last war was done by the Ministry of Munitions. The report is a complete vindication of the private trader. It finds, broadly speaking, that the charges against British armament firms are not proven and that whatever dangers are inherent in private enterprise can be averted by the proposed system of a Ministry of Supply. State control—not State monopoly—and the creation of a new Minister of Arms Supply are the two outstanding features of an eminently fair and candid report which we are convinced has been welcomed by everyone who has the welfare of the country and of the chemical industry at heart.

Gas Industry Research

ALTHOUGH the gas industry does not rank among the 21 industries which support a research association under the wing of the Department of Scientific and Industrial Research, its activities in that direction are conducted upon a scale commensurate with its national importance, and its autumn research meeting —the eighth of which has been held this week in London—is invariably productive of valuable information upon the chemical aspects of the manufacture of gas and the treatment of its by-products. Consideration has been given during the past year to the value of ammonium bicarbonate as a fertiliser, and experiments at Rothamsted have been supplemented by others at the experimental farm of Leeds University and at Coventry. One of the most interesting results was from laboratory experiment, which demonstrated the liability of ammonium bicarbonate to lose considerable quantities of ammonia by volatilisation when so applied as to be exposed to air currents, and the ease with which that loss might be prevented by a suitable method of application. There is reason to believe that ammonium bicarbonate properly applied would give results at least equal to those given by sulphate. Experiments have also been carried out on the use of concentrated liquor as a fertiliser, and the indications obtained with this substance are that, if applied with proper precautions, but not otherwise, equality of performance with sulphate may be expected. The question also arose as to whether there might not be local circumstances in which crude ammonia liquor would prove a useful fertiliser. The position occupied by ammonium bicarbonate cannot, however, be satisfactorily defined until the cost of its production on the large scale by the best possible methods has been more clearly ascertained.

The Japanese Iodine Trade

THE iodine industry of Japan is being threatened by imports of iodine from Chile, a cargo of 970 barrels with 123,300 lb. of iodine having been landed at Kobe at the end of July. It is reported that the Chilean Government has an interest in this consignment. The iodine trade in Japan reached its zenith in 1916, with an output of 294 tons. From that year onward there was an uninterrupted decline until 1929. A recovery in 1930 was attributable to Japan's departure from the gold standard, which reduced the value of Japanese currency and put Japan once more on a competitive basis in the international market. In Japan iodine is derived from seaweed, the method of extraction being identical with that used in other countries. The seaweed used, however, possesses only a medium content of iodine and so compels the Japanese chemical specialists to seek ways and means of extracting by-products in the course of manufacture. For instance, the research laboratories of the Ministry of Commerce and Industry have shown the feasibility of obtaining activated carbon and alginic acid as by-products. Furthermore, exhaustive trials by the Tokio Institute for Physical and Chemical Research have led to a plan for obtaining iodine chemically from brine, by a process similar to that exploited in Soviet Russia and the United States, giving iodine of 90 per cent. purity. There are fourteen firms in Japan now producing raw iodine. The chief of these are the Nippon Electric Engineering Co., the Nippon Metallurgical Refining Co., and the Koei Shokei and Ogaki Pharmaceutical Co.

A Business Forecast

LORD GREENWOOD warned the members of the Coke Oven Managers' Association the other day that the dangers of prosperity were no less real than the dangers of adversity and remarked that the present wave of prosperity could not be counted upon to last for ever. While we are not blind to the truth of his lordship's warning, we can take courage from the present situation. In its business forecast for the remainder of 1936 the Federation of British Industries states that the traditional signs of a boom are beginning to appear. Unemployment outside the distressed areas has fallen to a level at which, if due allowance is made for persons moving from one job to another and other normal factors, a shortage of certain types of labour begins to appear. Wholesale commodity prices also have been rising and conditions are favourable to a continuation of the movement. Export trade for the first time for many months is now showing a tendency to expand, but it is too early to judge how far the movement is likely to go.

Structure of Proteins and Certain Physiologically Active Compounds*

By Dr. D. M. WRINCH, Mathematical Institute, Oxford

RECENT studies have discovered the fact that a number of classes of physiologically active compounds (for example, the carcinogens, the sterols and bile acids, the sex hormones, the heart poisons) have all a similar framework[1]. Two questions then arise. (1) What is the significance of this similarity of structure? (2) Why do these compounds which have certain similarities of structure possess physiological properties so different as those, for example, of the sex hormones and the cardaic poisons? In answer to these questions we suggest that for certain types of interaction with the organism it is necessary (though not sufficient) that a molecule possess an affinity for, in the sense of superposability on, some "substrate" in the organism. This suggestion, which simply gives precise expression to an idea long since well established in physiological chemistry[2], accounts for the similarity of framework. The particular nature of the interaction may then be attributed to the degree of unsaturation (compare specially the carcinogenic hydrocarbons and cholesterol), to the occurrence of a lactone ring and to the occurrence and particular distribution of carbonyl, hydroxyl and methyl groups in the compounds in question.

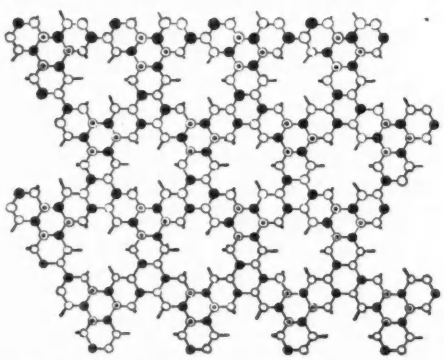

Fig. 1. The cyclol pattern. The median plane of the lamina is the plane of the paper. The lamina has its "front" surface above and its "back" surface below the paper.

● = N
○ = C(OH), hydroxyl upwards.
⊙ = C(OH), hydroxyl downwards.
○— = CHR, direction of side chain initially outwards.
○- = CHR, direction of side chain initially upwards.

In the course of an orderly search for some suitable substrate sufficiently widely distributed through the organism and yet possessing a common molecular surface pattern or mosaic, attention is naturally directed first to the proteins. More than any other chemical substance proteins have an inevitable connection with living matter; wherever there is living matter there proteins are found; wherever there are proteins there is, or was, living matter[3]. Undeniably, proteins are connected with the physico-chemical changes which occur during the life of an organism. They form a more or less permanent part of it, since only under conditions of starvation are they oxidised to release the energy required to perform the work of the cell[4] Furthermore, many facts belonging to protein chemistry (for example, the interchangeability of proteins as substrates for certain enzymes) suggest that proteins can possess a common surface pattern. For these reasons there is an inherent plausibility in postulating that the substrate whose mosaic is to have a geometrical affinity to the classes of compounds mentioned above is protein†.

The fundamental fact about the structure of proteins is that they consist of condensations of amino (and imino) acid molecules. Leaving aside the intermediate stages, polypeptides or substituted diketopiperazines, which may or may not occur in biosynthesis, and which in any event yield an identical pattern by means of cyclisation and polymerisation respectively, we find that it is possible to construct a simple polycondensation pattern of the amino acids. This "cyclol" pattern depends upon one and only one assumption, itself a simple extension of Fischer's hypothesis, namely, that amino acids can condense by means of single, double and triple peptide links. Given this assumption, the "cyclol" theory of protein structure follows by means of purely logical and mathematical arguments[5]. The plane form of the cyclol pattern is shown in Fig. 1.

Owing to the lævo character of all the amino and imino acids in proteins[6], the cyclol pattern is a dorsi-ventral lamina in the sense that from one surface all the side chains emerge, whereas the other surface is free from side chains. Here, then, is further evidence that it is possible for proteins with the most diverse chemical composition to share one common surface pattern, namely, that on the surface free from side chains. A number of the requirements of protein chemistry are thereby met; and the type of substance which is *a priori* most likely to be involved in reactions with the physiologically active compounds listed above, turns out actually to possess a common mosaic. Affinity with this mosaic then seems likely to be the explanation of the similarity of structure of these compounds. We have now to consider the details of this mosaic and its relation to the molecular framework of these compounds. On this occasion the question is discussed with reference to the carcinogens. The considerations adduced may also be applied to the sterols, the sex hormones, etc.

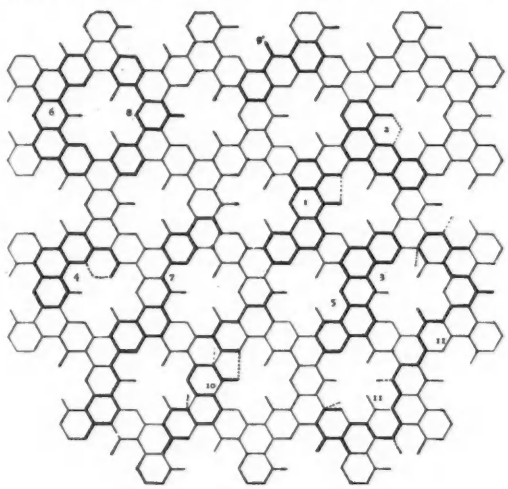

Fig. 2

It will give a fair picture of the situation as it stands to-day with respect to carcinogens if we consider the following substances, which are listed in a roughly decreasing order of potency: (1) methyl cholanthrene[7]; (2) 1,2-benzpyrene[8]; (3) 1,2,5,6-dibenzanthracene[9]; (4) 3,4-benzphenanthrene[10]; (5) 1,2,5,6 - dibenzacridine[10]; (6) 3,4,5,6, - dibenzacridine[10];

* Reprinted from "NATURE," October 10, 1936.

† In a recent research on the effect of methyl cholanthrene on mouse fibroblasts *in vitro* ("NATURE," 1936, 138, 291), Hearne finds that this carcinogen induces chromosome pairing and chiasma formation in somatic cells. In view of the protein in the nuclear membrane and in the chromosomes themselves (Wrinch, "NATURE," 1934, 134, 978, *ibid.*, 1935, 135, 788), this result affords some support for the suggestion that the 'substrates' upon which carcinogens act are protein in nature.

(7) 2-(*p*-aminostryryl)-6-(*p*-acetylaminobenzoylamino)quinoline methoacetate[11]; (8) triphenyl benzene[12]; (9) tetraphenyl methane[12]. All these structures have a geometrical affinity to the cyclol pattern which is shown in Fig. 2 with its " back " surface upwards so that all the side chains emerge below the plane of the paper. The frameworks of (3), (5), (6) and (7) are completely superposable on this mosaic: that of (2) and of (4) are superposable except for one atom as shown by dotted lines. The case of methyl cholanthrene is interesting, in that complete superposability can be obtained by including an imino acid residue in the cyclol pattern.

A Superposable Framework

Alternatively, the framework is superposable, as shown in Fig. 2, except for the distortion of the five-membered ring, shown by the dotted line. Triphenyl benzene is superposable to the extent of 21 of its 24 carbons: furthermore, it can attain this superposability in three different ways. The position with respect to tetraphenyl methane is rather different since this compound is not even approximately plane. In Fig. 2, (9) shows part of its skeleton: 14 of its 25 carbons are superposable in the cyclol pattern. Since this molecule is non-planar[13], the possibility of the superposition of these 14 atoms on the cyclol pattern requires that the cyclol pattern shall not be plane at that point, but take up an orientation in which two neighbouring diazine rings do not share the same median plane, but have median planes making the tetrahedral angle with one another. The affinity of (9) to proteins is therefore not to the plane cyclol pattern as shown in Figs. 1 and 2, but to the general three-dimensional cyclol pattern, which has already proved useful in devising structures for the globular proteins[14].

This preliminary study of the affinities of the carcinogens for the cyclol mosaic presents two points of interest. Evidently a structure may be partially or even wholly superposable on the cyclol pattern without possessing the phenanthrene nucleus. Further, since the cyclol pattern need not be planar, there is no reason to expect that all carcinogens are planar. The substance (9), far from being an anomaly, may be the first of a new type of non-planar carcinogens which have a geometrical affinity to the non-planar cyclol pattern.

The suggestion that ordinal similarity of molecular structures is a necessary (though not sufficient) condition for certain types of physiological interaction, and that the special nature of these interactions is then determined by special atomic groupings, is in good accord with phenomena belonging to many fields of physiological chemistry. As an example we cite the case of the specific polysaccharides of types I, II, III, IV pneumococcus, which are antigenic when coupled to a protein, although the antigenic reaction is specific to the polysaccharides [15]. We may suppose that the importance of the protein constituent resides in its superposability on a protein substrate, the nature of the action being conditioned by the polysaccharide. It is perhaps appropriate to direct attention at this point to the far-reaching consequences which are logically entailed if, as is now suggested, proteins of different chemical composition can yet possess a common surface pattern.

The Cyclol Pattern

The geometrical relationship of the cyclol pattern and the framework of the physiologically active compounds mentioned above further suggest that proteins may be the seat of biosynthesis. We suggest that cholesterol and carotene, for example, are formed in the organism by superposition on a cyclol template. The " ingredients " may be pictured as long carbon chains which on superposition cyclise as shown in Fig. 2 (see (10) for cholesterol and (11) for carotene) or possibly as shorter carbon chains which then join up intermolecularly.

It appears that there is an important field for experimental work in the study of the processes of (intramolecular) cyclisation and (intermolecular) polymerisation with special reference to the use of large molecules of various types, including proteins, as templates. Such researches may throw light upon the mechanism at work in Nature which, from a vast array of possible structures, selects in fact only a few. Incidentally, they should confirm or refute the present suggestions, which amount to a simple interpretation of this mechanism in terms of the common mosaic of proteins predicted by the cyclol theory of protein structure.

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Death of Professor T. M. Lowry

His Service to Physical Chemistry

PROFESSOR THOMAS MARTIN LOWRY, F.R.S., who had been professor of physical chemistry at Cambridge since 1920 and a member of Trinity Hall, died on Monday at Cambridge at the age of 62.

The second son of the Rev. E. P. Lowry, who was senior Wesleyan chaplain at Aldershot, he was born at Low Moor, Bradford, on October 26, 1874. Educated at Kingswood School, Bath, he entered later the Central Technical College of the City and Guilds Institute, South Kensington. Here for 17 years, from 1896, he held an assistantship to Professor H. E. Armstrong, F.R.S., and was for part of the time lecturer on chemistry at the Westminster Training College. From 1912 until 1916 he was lecturer in chemistry at Guy's Hospital Medical School. He was elected F.R.S. in 1914, and had been an associate member of the Ordnance Committee since 1916, was an advisory member of the Trench Warfare Committee from 1917 to 1919, Director of Shell-filling from October, 1917, to June, 1919, and an additional member of the Chemical Warfare Committee from 1918 to 1925. He was made an O.B.E. in 1918 and a C.B.E. in 1920, and received the Italian Order of St. Maurice and St. Lazarus.

As Bakerian lecturer of the Royal Society in 1921 (in collaboration with Dr. P. C. Austin) Professor Lowry dealt with " Optical Rotatory Dispersion." On the same subject he discoursed in December, 1925, before the Société de Chémie Physique, Paris, in exemplification of Biot's researches. He was a member of the Council of the Chemical Society for four years, and vice-president in 1922-24; he was also twice vice-president of the Faraday Society and president in 1928-30, and vice-president of the Oil and Colour Chemists' Association in 1925-28. He took the degree of D.Sc. at London University in 1899, and received honorary doctorates from Dublin and Brussels. He was the author of " Historical Introduction to Chemistry," " Inorganic Chemistry," and " Optical Rotatory Power." Professor Lowry married in 1914, Eliza, daughter of the Rev. C. Wood, and had two sons and one daughter.

The funeral service was held at Hills Road Methodist Church on Friday.

UNITED STATES benzole production, estimated by the Bureau of Mines from the production of coke at by-product ovens known to recover this commodity, totalled 49,890,134 gal. in the first half of 1936 compared with 36,467,000 for 1935.

Building and Equipping a New Factory—III

By J. H. WEST, M.I.Chem.E.

THE site of a factory during the construction period is a scene of intense activity, all of which is controlled and directed by the resident engineer. The duties of this official are very various and highly responsible. At the beginning he has to set out and mark with pegs the correct position of the roads, sidings and buildings, reproducing the lay-out drawing on the actual ground, and check the levels of foundations, excavation and filling as this work proceeds. He has to arrange how material is to be got on to the site, where it can be stored or dumped until required, and this may mean the laying of a temporary siding if much material will come by rail, and almost certainly the laying of sleeper roads if the ground is at all soft. Sites must be found for contractors' huts where they will not be in the way.

The Resident Engineer

There is next the watching of contractors to see that all materials and workmanship are up to specification and that the work is carried out in a proper manner. It must be remembered that whilst the principals of contracting firms are usually perfectly honest, their foremen on the site are anxious to do the work as cheaply as possible, and if they can get away with a certain amount of scamping they will do so. Concrete work, in particular, is open to the substitution of inferior cement or aggregate, insufficient mixing, the addition of too much water, and inefficient ramming during carting. If steel fixers are not watched they will enlarge holes by drifting instead of reamering, and may even burn them out. Every trade has its own scamping tricks, and it is the resident engineer's job to spot them all and stop their use.

Another question that must be carefully watched is that of labour and the possibility of strikes. Some contractors use trade union men and others non-union, but the two will not work together in the same trade, hence the introduction of one or two non-union men by a contractor who is a late arrival on the scene may be enough to bring out a large number of union men already working there.

A very important duty of the resident engineer is the regular measurement once a week or once a fortnight of work done on a schedule basis, such as excavation, concreting, road making, and so on, and the issue of certificates for payment on account. In the later stages when erection of plant and equipment is going on and there are a large number of contractors or sub-contractors working at the same spot and getting in each other's way, the resident engineer must also act as arbitrator and decide upon the order in which the work is to be done so as to minimise any delay from this cause.

Still another matter which requires very careful watching is the question of extras to contracts, due to alterations or additions which may be found necessary after the contract has been placed. These extras are done on a timework or time and material basis, and it should be settled at the beginning what percentage the contractor is allowed to add to cover his profit. Ten per cent. on actual cost of material and 20 per cent. on wages actually paid is a usual arrangement. It should be laid down that contractors will not be paid for any extras for which they have not received instructions in writing from the resident engineer.

Temporary Facilities

Certain facilities must be provided from the day that work starts on the site, and others will be needed as the work proceeds. It is well to plan out all these well in advance, taking into account the methods of carrying out the work which have been decided upon, and the location and surroundings of the site. The first thing is an office hut, with telephone connection, for the resident engineer. The size and arrangement of this hut will depend upon the size of the job, and may range from a two-room hut to a large bungalow. At a somewhat later stage a store hut will be needed in which to keep small pieces of plant and accessories until they are wanted for erection; such things as motors and starters, valves and pipe fittings, and so on. This should be amply large; it is surprising what a quantity of material of this kind will accumulate and it is essential that it should be laid out so that any given item can be quickly found. A reliable storekeeper should be put in charge of this hut.

If the site is not in a town and the contractor's men have to come some distance by train or bus, it is very desirable to provide a large hut with one or two heating stoves in winter where the men can shelter during heavy rain and dry their clothes. In the early stages, when the work is in the open, if it comes on to rain heavily in the morning the men will have to knock off and go home if no shelter is provided, whereas, with the shelter suggested, they can go there and get back to work if the rain slackens. Provision should also be made in this hut for a supply of boiling water for tea, and a canteen may be added with advantage. The running of this can be let out, and the proceeds of the contract will help to pay for the cost of the shed. In the writer's opinion it pays well to attend to the comfort of the men working on the site, more particularly if the job is a rush one and loss of time must be avoided.

If the company is undertaking the erection of part or all of the plant, it will be necessary to provide a temporary workshop, and in this case time will be saved by putting in a few simple machine tools which can afterwards be transferred to the permanent workshop as soon as this is ready. A lathe, a screwing machine, a light and a medium drilling machine, a hack-saw machine, together with pipe-bending tackle, a blacksmith's forge, and plenty of bench room with vices is all that is needed.

As regards temporary services, water will be required for mixing concrete, and at a later stage for testing tanks and pipe lines; light will be needed both out of doors and inside the buildings to enable work to go on after dusk in the winter. During the plant erection period abundant light inside is essential. If a public supply is available the matter is simple; if not a secondhand petrol or paraffin motor generator set can be put down, or better still two units, since failure may hold up a large number of men. A certain amount of electric power is also very useful for working the contractors' cranes and air compressors.

Erection of Pipework

Large pieces of plant are best placed in position as early as possible before the floors are down. Motors and other electrical gear are best left until as late as possible, since standing in an unheated, and therefore damp, atmosphere will not do the windings any good.

The problem of pipework, especially in factories where the materials and products are largely liquid, is a very important and difficult one. There are two ways of tackling it. One is to make no drawings of the pipelines apart from diagrams, and to bend and cut all pipes, apart, of course, from cast iron, on the site, the best runs for the various pipes being determined on the spot and measurements for the individual lengths measured up as the erection proceeds. This system, provided it is carried out under the supervision of an experienced and really good foreman pipe-fitter, has much to recommend it. To begin with, it saves an enormous amount of drawing office work. In the case of one of the type of factories alluded to above, if all the pipelines are to be drawn out and detailed beforehand, it may keep a dozen draughtsmen busy for many months, and it is most extraordinarily difficult to make pipework drawings which are correct and workable when all the information regarding obstacles in the way of the runs has to be pieced together from a number of

building and steelwork drawings and plant arrangements. It is definitely easier to trace out a suitable run on the job itself.

Erection will not proceed so fast, of course, as if the pipelines had been detailed out and all lengths cut and bent and flanged in the shop and sent to the site ready to hang and couple up. Nor, perhaps, will the arrangement of the pipes be as symmetrical and neat-looking as if every line had been laid out on the drawing board, but if speed is the main consideration, cut out the drawings and go straight ahead on the site every time, but remember that in this case proper facilities for filling and bending copper and aluminium pipes and for cutting, bending and screwing steel pipes must be provided on an adequate scale to allow the work to be pushed forward rapidly by a large squad of skilled pipe-fitters.

A Wise Precaution

Cast-iron pipes, particularly specials, that is, non-standard bends, unequal tees and straights with branches cast on, take a long time to get, and, furthermore, gaps for closers must be left in cast iron lines, and these template pipes cannot be measured up and ordered until the rest of the line is erected. Hence the cast iron lines should be the first to be tackled.

It is a wise precaution to remove all small brass and gunmetal fittings, which are easily detachable, from machines or other pieces of plant when these are being erected, and keep them in the stores until the plant is about to be put into commission. If this is not done they will probably be missing when wanted.

The necessity for steam for heating pipes and vessels which are to be covered with plastic lagging has already been referred to. If there is much of this work to be done it will take a long time, so do not leave it too late, but make a start in good time. Another important point is that steam must be kept on continuously for at least 24 hours to dry each layer of plastic thoroughly before the next one is put on. Steam which is only available in the daytime is no use.

Plenty of time should be allowed for the drying out of furnace settings, both in the boiler house and elsewhere if there are process furnaces.

When all of the plant is erected and coupled up, the job is by no means finished. The cleaning of floors, stairs, vessels and other plant is quite a lengthy job, and after that comes painting of steelwork and plant. Pipework, and sometimes vessels also, are painted according to a pre-arranged colour scheme so that pipes carrying high and low pressure steam, hot and cold water, and the various process liquids, can be readily singled out.

The Final Stage

All tanks and vessels must then be tested for staunchness if this has not already been done, and all pipe lines must be tested under at least their maximum working head to discover and remedy leaky joints. Where it is necessary to know the capacity of vessels at various dips they must be calibrated, and curves prepared for reducing inches of dip to gallons. All centrifugal pumps should be run and their discharge per minute be checked.

Thermometers, pressure gauges, and other instruments can now be fitted where required, and the plant should be looked over thoroughly from end to end to see that no detail is missing. At least two to three weeks should be allowed for this final stage, and even longer in very large plants.

In conclusion, it may be pointed out that success in building and equipping a new factory efficiently, quickly and economically, depends to a great extent upon close collaboration between the office and the site, that is, between what we have called the construction department and the resident engineer. On the one side the office must keep the resident engineer provided with all the drawings, specifications and the latest news regarding dates of delivery, and particularly with notification of any alterations decided upon at the last moment, and the resident engineer can help the office a great deal by pointing out snags or difficulties which have been overlooked when the drawings were made, by giving them a lead on the order in which he wants various items delivered, and by pointing out matters which have fallen behind schedule time, or are taking longer than was anticipated.

Industry and the University

Professor T. P. Hilditch Addresses the Liverpool Section of the S.C.I.

THE opening meeting of the Liverpool Section of the Society of Chemical Industry took place at the University on October 23, when Professor T. P. Hilditch was installed in office as chairman of the Section.

Professor Hilditch, in announcing the death of Dr. Schack Sommer, mentioned that he was chairman of the Section in 1895-96 and was a pioneer in the development of the sugar beet industry.

The chairman then presented the Leverhulme Prize to Mr. L. S. Clarkson, of Singleton Avenue, Birkenhead, who recently took the degree of B.Sc. with first-class honours in physical science at Liverpool University, and is now proceeding to a course of physical research in the Department of Chemistry.

In the course of his report, the hon. secretary, Mr. J. W. Towers, mentioned that there had been a net increase of twelve members during the year, the total membership being 308. The number of associate members was 22 as against 27 in the previous year. The annual conference at Liverpool had proved a great success, and 5,000 tickets were issued to 573 members and guests.

In the course of his address on "The Society, the Industry, and the University," Professor Hilditch said the Liverpool Section of the Society had always had many contacts with the University since the earliest days of both. Members of the University staff had occupied the chair during sixteen sessions, while the duties of honorary secretary had been performed by five members of the University during two consecutive periods respectively of fifteen and twenty-one years. Exactly fifty years ago, Dr. J. Campbell Brown, the first professor of chemistry at Liverpool, became chairman of the Section and his chairman's address in 1886, and his opening remarks in the 1887 session made interesting reading to-day.

Industrialists were to-day looking more and more to the universities for their personnel. "The larger and more progressive concerns," he said, "look increasingly to the post-graduate schools of the universities as the main source of supply of trained recruits for their works."

Research work is not quite the wholly academic pursuit that many people believe it to be. "The discipline of employing known facts or processes to achieve new results, with its ancillaries of learning how to use chemical literature, and how to devise or improve apparatus, is a valuable mental, as well as physical, training for the utilisation of a man's knowledge when he enters a works."

Professor Hilditch also had some things to say about the examination system to-day. In order to get a B.Sc. Honours degree to-day, he said, twice as much ground has to be covered as was the case a generation ago—but the son gets his degree in just the same period of study as his father used to. If there were faults to be found with the examination system it was of no use to gird irresponsibly against the system unless you could provide a better alternative.

Ideas and Industry

By HARRY BARRON, Ph.D., B.Sc., A.I.C., A.I.R.I.

INVENTIONS are the vitamins of industry. Without a constant supply of ideas and inventions, industry becomes stagnant and non-progressive. New ideas and new products are essential in order to maintain public interest, while new processes and methods result in greater production of cheaper products having wider appeal. These effects are achieved by the process of invention, often the result of organised development and research. There is, however, an enormous volume of ideas and inventions which percolates into industry through unorganised channels. It is the object of this article to consider this aspect of the subject.

While many results of organised research are automatically applied to their respective industries, it is rare to hear very much of them, the effects being apparent only by results. On the other hand isolated inventions mainly of the gadget type invariably receive a great deal of publicity, depending on their novelty. This is well illustrated at the annual exhibitions organised by the Institute of Patentees. The records of patents supply some indication of the activity of inventors, but, of course, these figures represent a fraction of actual ideas and inventions conceived during any period.

Inventions and Ideas

Inventions start as ideas. An idea occurs to the mind, inspired by any one of an infinite number of circumstances. It is transferred to paper, where it can be considered in closer detail, and then it is necessary to try it out in practice. Ideas are organic insofar as one idea is no sooner brought to a practical stage than the new circumstances so brought about occasion a number of further ideas. For example, a motor car was once (not so many years ago) an idea. Every successive stage of development brought it to a state which stimulated innumerable new ideas, a process which is by no means exhausted. So with aviation, wireless, television, and every other form of industrial activity. It does not follow that ideas and inventions which are applicable to any particular industry need come from people engaged in that industry, although this is more generally the case. Quite often a newcomer sees things with a mind which is not blunted by familiarity. In general, processes and new methods of production almost invariably come from within a particular industry, while ideas for finished products can derive from any source.

The relationship between the inventor and industry is a very interesting one which has not received the attention it deserves. There appears to be a complete lack of understanding between the industrialist (or manufacturer) and the inventor. As a rule manufacturers look upon inventors as unpractical cranks, while they are regarded by the inventors as soul-less, mercenary exploiters. Each considers the matter from an entirely different point of view. The manufacturer looks at an idea or invention purely from the angle of pounds, shillings and pence. The inventor is generally an idealist and looks upon his invention as a boon to humanity and quite divorced from considerations of "filthy lucre." One of the outstanding features of inventors is their profound belief, which is quite unshakeable, that their invention is the greatest thing the world has ever seen. It is incredibly valuable and revolutionary. Its wet-blanket reception by a manufacturer is almost unbearable to them. There can be no doubt that owing to the lack of efficient liaison many potentially useful and valuable ideas are wasted or mishandled.

The position of the inventor is complicated by the necessity in modern industry for intricate and expensive machinery. Quite clearly an individual who is but slightly acquainted with a particuar industry, has little knowledge of the processes employed in that industry, of the plant used and of the cost involved. He is also unfamiliar with the commercial details involved in selling the products. Inventors may indeed be directly concerned in an industry without being acquainted with these factors. It is this entire lack of commercial knowledge which is the greatest defect in the inventor's make-up. The creation of a product is after all but the first step, being necessarily followed by production and distribution. In these days the distribution and selling of products are the most difficult features of manufacture.

Inventors are far too prone to approach manufacturers with ideas which are not completely developed. They do not appear to comprehend that most manufacturers have neither the time, the staff, nor the plant to devote to finishing off incomplete schemes. They are usually fully occupied with production problems. Half-baked ideas are useless to them. It is necessary that inventions and ideas should be quite ready for exploitation and should not require appreciable development by the manufacturer. It is also essential that some idea of costs, plant requirements, and potentialities should accompany samples and technical data.

Where new capital is sought a scheme should be even more comprehensive. It should include in addition to the above particulars, availability of raw materials, personnel requirements and capital requirements.

It is very unfortunate that commercial knowledge is not part of the make-up of the average inventor. There is no doubt that there are innumerable instances where inventions and ideas which could be of considerable value are wasted, because the person concerned is unable, either through ignorance or incompetence, to supply the necessary particulars. When a scheme does go through, very often the inventor comes off badly through this lack of commercial ability. This gives rise to complaints of the exploitation of the inventor. The exceptions are so brilliant as almost to give the lie to the ineptness of inventors. Such men as Edison, Ford and a few others are exceedingly rare.

Assisting the Inventor

A situation which arises frequently is when an inventor offers a product to a manufacturer. The latter is quite willing to produce the article if the inventor will pay for the necessary tools and will place a minimum order. This is quite a usual procedure in the rubber and plastics industries with which the writer is closely connected. Here tool costs are very high, and the proposal to purchase a quantity of experimental articles cannot appeal to the average inventor. Consequently, an idea which may be sound is dropped. The only alternative is for the inventor to set up a small experimental plant, which is again very costly and out of the question. In general, inventors are impecunious.

There is a need for the provision of adequate facilities where ideas can be tried out. So far as most industries are concerned there is no means by which any ideas from unsponsored sources can be developed. The result is that many ideas live and die on paper. Many of the great concerns could quite profitably run a department merely for handling ideas from outside sources. Many firms have development departments, but these are generally unreceptive to unsponsored schemes. In some quarters there is a tendency to disparage excessive ideas. It is quite understandable that most ideas will be useless. An average of one useful idea out of twenty may be regarded as being very good. But unless the twenty come up for consideration generally the useful one does not appear. From a commercial viewpoint the one idea may more than compensate for the time devoted to the others.

Another aspect of the relationship between the inventor and the manufacturer is the question of protection. What guarantee has an inventor that his idea will not be pirated? The patent system does afford some measure of protection, but many ideas, although of commercial value, are not patentable.

In some cases indeed, it may be advisable not to patent ideas.

Most manufacturers will give an inventor a square deal on a genuine commercial proposition. Yet there is always some danger involved in taking an idea along to a manufacturer. With the best will in the world, if the idea is turned down, it may be difficult for the manufacturer not to appropriate useful features, and this often happens. Ideas generate ideas, and the suggestions brought forward in some proposition may also lead to a train of thought which will generate improvements on the matter under consideration. There are, of course, concerns which will not have the slightest hesitation or compunction in appropriating anything useful. There is, also, a peculiar type of individual who is able to listen to information and within a short time regurgitate it as his own idea. It is ethically wrong to appropriate other people's ideas without compensation, but the tendency in modern business is to ignore such considerations. It is therefore up to the inventor to watch his step very carefully.

There is room to-day for a class of men to act as intermediaries between the inventor and the manufacturer. To some extent this function is exercised by solicitors, accountants and patent agents. But more important than the expert knowledge of law, costs or patents is the knowledge of the mechanics of industry, both productive and commercial. It is difficult to formulate any definite steps which would eliminate the waste of energy due to lack of understanding between manufacturer and inventor. The manufacturer should be rather more tolerant of the inventor and should translate his inept explanations into terms of commerce. The inventor should familiarise himself with those aspects of his ideas, which, although divorced from the actual invention, nevertheless play a great part in their application.

Emission of Offensive Fumes in Scotland

Annual Report of the Chief Inspector of Alkali, etc., Works

ACCORDING to the annual report on alkali, etc., works in Scotland, the number of works in Scotland registered during 1935 was 95, in which were operated 169 scheduled processes as follows: Four alkali (saltcake); 1 alkali (wet copper); 11 chemical manure; 4 nitric acid; 11 sulphuric acid; 8 sulphuric acid, Class II; 7 bisulphite; 7 lead deposit; 8 sulphide; 36 sulphate of ammonia; 3 muriate of ammonia; 16 gas liquor; 41 tar; 1 arsenic; 2 nitrate of iron; 1 picric acid; 3 chlorine; 2 muriatic acid; 1 paraffin oil; 2 zinc extraction. The number of registered works has decreased by two as compared with 1934; actually, registration was discontinued for four works, whilst two were added to the register. Of the former, one was an iron works where the use of coal as fuel was replaced by coke, thus rendering the by-product plant inoperative; two were tar plants in gasworks and one a smelting works. Of the latter, one was for the manufacture of sulphate of ammonia and tar in an iron works.

During the year, 353 visits of inspection were made to registered works; 160 visits were also made to places not registered under the Act. The clauses of the Alkali Act which regulate the escape of noxious and offensive gases have generally been well complied with, and in only one case (in a sulphuric acid works) was the statutory limit laid down by the Act for the amount of acidity of final exit gases exceeded.

The amount of salt decomposed in alkali works has been approximately the same as that used in 1934. The average amount of hydrochloric acid discharged to the atmosphere in residual gases from chimneys and other final outlets was 0.050 grains per cu. ft.; the average acidity was 0.21 grains calculated as sulphur trioxide.

Acid Gases from the Chamber Process

The annual returns of the amount of pyrites and spent oxide burned for sulphuric acid shows that the acid production in Scotland during 1935 has decreased slightly, but only by some 5 per cent. Escape of acid gases from outlets in the chamber process has been maintained at a satisfactory figure. On one occasion, however, the statutory limit was exceeded, but the infringement was only temporary and was caused by a plant breakdown. The average escape from chamber plants was 0.85 grains of acidity per cu. ft. of exit gases, expressed as sulphur trioxide, whilst in concentration plants (Class II) the average escape was 0.35 grains. Contact process manufacture has been carried out in a satisfactory manner and the average escape for the year was 1.50 grains per cu. ft. of residual gases, expressed as sulphur trioxide.

Complaint against a large chamber process plant situated in a thickly populated district in Glasgow, to which reference was made in the report for 1934, has been renewed. Steps are, however, being taken by the owners of the works and it is hoped still further to reduce the acid content of the residual gases from both the main plant and from the concentrators.

In the manufacture of artificial fertilisers the annual returns show that the consumption of raw materials for superphosphate production has decreased by about 10 per cent. as compared with 1934 and is at the same level as in 1933. The removal of acid gases by the various wash towers has been very satisfactory, the average absorption being 99.5 per cent., whilst the average acidity of the residual gases after scrubbing was 0.042 grains per cu. ft., expressed as sulphur trioxide.

A Superphosphate Plant Complaint

Previous reference has been made to a complaint of offensive odours emanating from a superphosphate plant in Glasgow. In the last report it was indicated that the offensive odour of the exit gases seemed to be due to an excessive amount of organic material in the phosphate rock, and experiments showed that deodorisation could be effected with hypochlorite. The firm installed a system of chlorination whereby the exit gases were subjected to the action of gaseous chlorine from a cylinder. This proved entirely satisfactory, but it was found that only one consignment of raw material was affected, and when this was consumed it was no longer necessary to continue deodorisation. The chlorination apparatus has, however, been retained for use in the future should similar circumstances arise.

The amount of nitric acid produced is almost the same as the previous year. The several plants have been well maintained and operated, and manufacture by catalytic oxidation of ammonia has now largely displaced the older method of decomposition of nitre.

As compared with 1934 ammonia production has shown a further increase of some 5 per cent. The process of concentrating gas liquor for its manufacture to ammonium sulphate in central plants is becoming increasingly popular, and new concentration plants have been erected during the year. During 1935, 12,500 tons of concentrated liquor (calculated as 15 per cent. ammonia) were produced; in 1934 the figure was 10,000 tons; in 1933 it was 2,000 tons. Thus 35 per cent. of the ammonia produced in gasworks and coke ovens is now concentrated before being fixed. In the report for 1934 the disposal of foul gases from this type of plant was referred to, and the use of weak gas liquor as a scrubbing agent for tail gases was described.

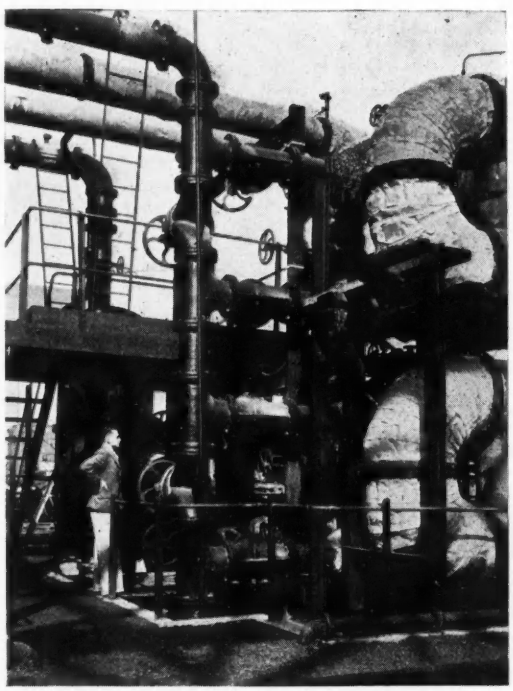
The production returns for the year show that the amount of tar distilled has remained at about the same figure as the previous year. In point of fact it has decreased slightly, but the pitch production has increased by some 12 per cent.

The Saunders Diaphragm Valve

A Valve Which Cannot Leak

THE Saunders valve, which is now well known in every branch of the engineering industry, had its inception in South Africa, where Mr. P. K. Saunders, the inventor, was a mining engineer. It was unfortunate that at the time Mr. Saunders patented the valve the world was suffering from the great depression and, although the invention was licensed to the Rees Roturbo Manufacturing Co., Ltd., very little progress was made during the period 1931 to the middle of 1933. During this period Mr. Saunders was in the United States, resulting in a considerabe industry being built up around the Saunders patents.

The vast developments of rubber compounds and synthetic



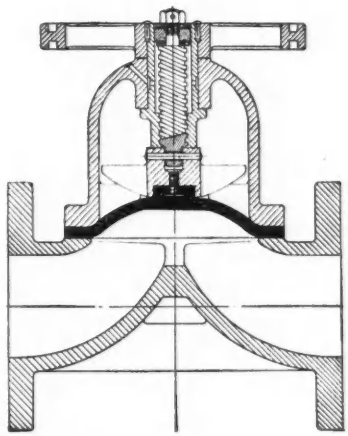
A Battery of 10 inch Saunders Valves at the Billingham Works of Imperial Chemical Industries, Ltd.

rubber substitutes have greatly increased the field of utility for the Saunders valve, which is now used in practically every important industry in the British Empire.

In 1933, when Mr. Saunders returned from the United States, he found that the English licensees were going into liquidation, so, in September of that year, he formed the Saunders Valve Company with a staff of one and one-room premises in Lichfield Street, Wolverhampton. Within three years from that date the company has acquired a large well-built factory in Drayton Street, Wolverhampton, with up-to-date plant and such ample stocks that all reasonable requirements can be met at shortest notice. The company has its own branches in Leeds and London, and well-equipped representation in all important centres.

A Diaphragm of Two Years' Life

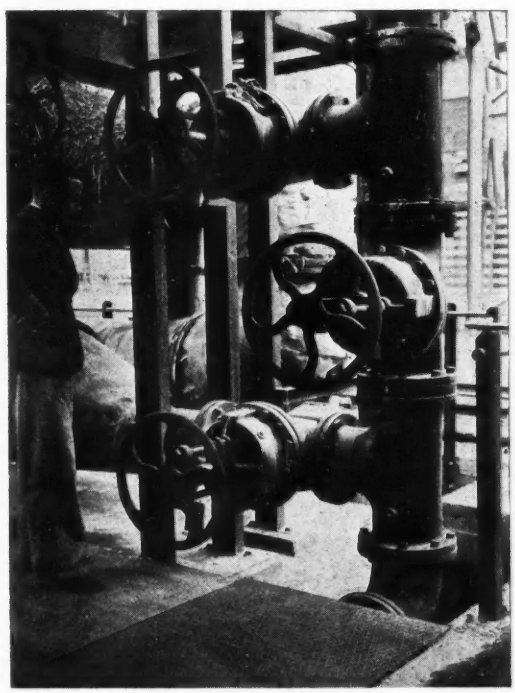
Saunders valves are exported literally all over the world from Wolverhampton, rather more than half the output being for export. For those who are not already familiar with the Saunders valve the principle is shown in the accompanying diagramatic sketch. A flexible reinforced rubber diaphragm acts to open and close the valve and also to seal the working parts from the fluid. It will be seen that this type of valve cannot leak until the diaphragm actually ruptures, and we



The Standard Saunders Diaphragm Valve as seen in section

are told that the life of the diaphragm is usually in excess of two years.

The Saunders valve particularly lends itself to lining with glass, hard rubber or lead, as it is only the body portion which requires to be so lined, with a result that a very considerable industry has developed in chemical valves under the Saunders patents. In addition to the Saunders diaphragm valve, the



A Close-up View of the Valves at Billingham.

company is now developing other lines, and it seems not unreasonable to suppose that, given fair good fortune, the company may, by 1940, have become a very important undertaking.

TOTAL output of barytes in Great Britain during 1935 was 63,723 metric tons, which was an increase of 5,141 tons over 1934. The principle counties producing barytes are Ayr and Bute, 26,724 metric tons; Devon, 18,661 metric tons; Salop, 16,744; Derby, 4,683; and York, 1,412. Small quantities were also obtained from the counties of Durham, Westmorland and Montgomeryshire. Imports and exports of barytes into and from Great Britain were also greater, the former reaching 45,156 metric tons, while the latter was 3,135 tons.

The Chemical Club

Reduced Fees for Younger Members

THE eighteenth annual meeting of the Chemical Club was held at 2 Whitehall Court, London, on Tuesday evening under the chairmanship of Mr. H. J. Pooley, chairman of the executive committee.

Mr. J. Davidson Pratt, hon. secretary, in presenting the annual report, recalled that at the last annual meeting the need for securing additional members was stressed and all members were asked to assist. The membership campaign had been continuously before the executive committee, which decided in May that an attempt should be made to attract those who were just entering the profession of chemistry by offering to accept at half rates and without entrance fee, suitable candidates who applied prior to their twenty-seventh birthday. The necessary modifications to the rules were being submitted to the meeting for confirmation. A few members had already joined under these conditions. Members were again asked to help the committee in its efforts to obtain the additional members necessary to put the club's finances in a healthy condition. A minimum membership of 600 was desired.

A Net Gain of Fifteen Members

The membership on August 31, 1935, was 504. During the year the club had lost 32 members by resignations and death, while the number of new members including reinstatements was 47, a net gain of 15, compared with a net loss of 12 the previous year. The net membership on August, 1936, was 519. The accounts showed an increase of approximately £15 in expenditure due mainly to essential increases in wages of staff and the necessity for reprinting application and other forms. Income had increased by £50, and the deficit on the year's working had been reduced from £82 to £47.

At the last annual meeting the committee was asked to revive the informal talks which had previously been much appreciated. Three such talks were arranged and were an outstanding success. A more extended series was being arranged during the coming winter. Excellent speakers had been secured.

The officers were re-elected as follows:—President, Mr. J. F. Ronca; chairman of executive committee, Mr. H. J. Pooley; hon. treasurer, Mr. T. H. Fairbrother; hon. secretary, Mr. J. Davidson Pratt; auditors, Messrs. Hughes and Allen.

The meeting approved the necessary amendments of the rules to permit of the election to membership without entrance fee of those who join the club prior to their 27th birthday, and of the payment by such members of half the standard subscriptions until after the year in which they reach the age of 27.

British Engineering and Empire Development

The Future of Civilisation

SIR ALEXANDER GIBB, in his presidential address to the Institution of Civil Engineers on Tuesday, said that engineering, turning to practical account the discoveries of science, was the foundation of civilisation, and that, in the same way, engineering had been the foundation of the British Empire—as it had to be of every empire. In his opinion, the opportunities of the future were vastly greater than any that the past had offered, but he looked with some anxiety on the years to come. The machine sometimes seemed to be taking control; inventions and developments succeeded one another with bewildering speed, and there seemed to be no limit to the possible results of uncontrolled and misapplied ingenuity. In such circumstances, no one could see where engineering might lead, or what limit there was to the power of the engineer. One thing was certain, however, and that was that there ought to be control.

He estimated that engineering provided directly or indirectly the livelihood of about one-seventh of the working population of Great Britain. To-day was the age of ever-increasing specialisation, and it had inevitably resulted in engineering being split up into dozens of different categories and groups. He thought that if the great problems of the future were to be adequately dealt with, it was necessary to put a brake on that continuous disintegration, and that an attempt of some form or other should be made to co-ordinate and unite engineering activities in the broadest sense. It was necessary for everyone, individuals and institutions alike, to subordinate some of their more personal and independent views and feelings to a common policy. He hoped that the steps that the Institution of Civil Engineers was taking in that matter would lead to profitable results. Useful work had already been done in the wider question of co-operation with engineering institutions, but as yet it was still on far too restricted a scale. He would like it to be possible for one broad policy to inspire and guide all classes of engineers, and he hoped that in time there would arise a body of engineering opinion so weighty, so authoritative, so sure, so sane, that it would prevent waste of energy and misplaced enterprise, and would inevitably command attention in the politics, administration, and life of Great Britain and the Empire. He believed that that would be the greatest, and perhaps the only safeguard for the future of civilisation.

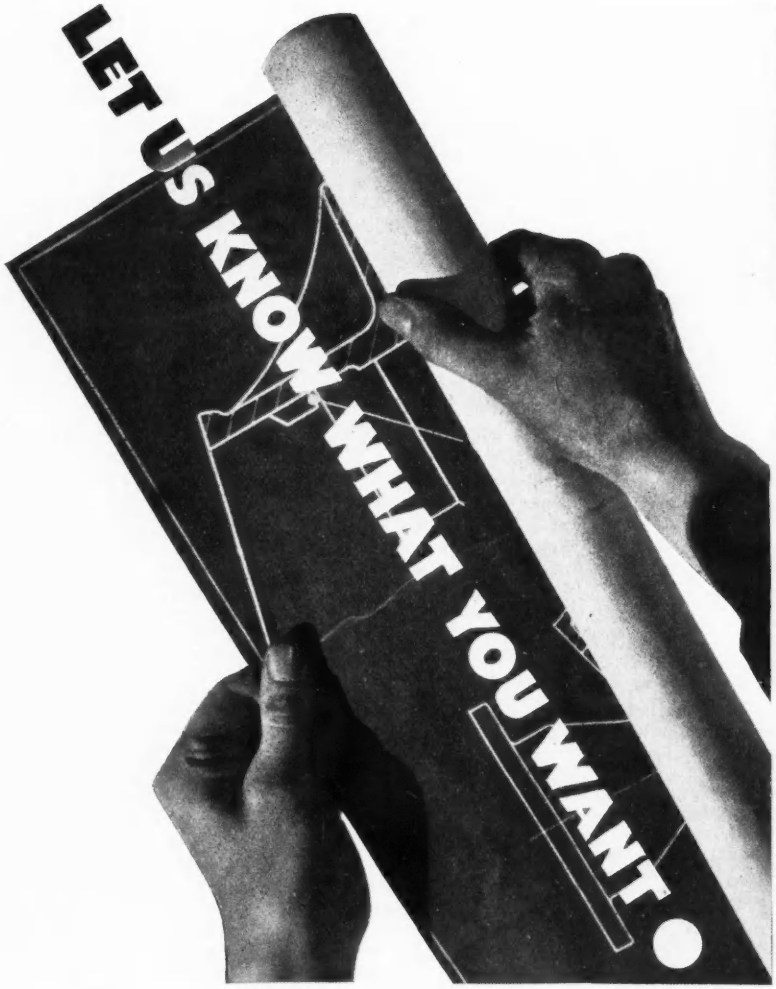
New Dyestuffs

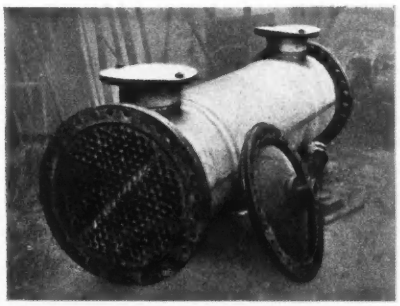
A New Acid Wool Colour

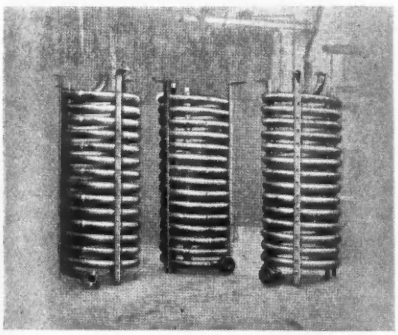
TWO new dyestuffs are announced by Imperial Chemical Industries, Ltd. Lissamine Fast Red 3GS is a level dyeing acid wool dyestuff of very good solubility, and yields bright bluish-red shades possessed of very good fastness to light. It is of particular interest in that it does not hydrolyse and become bluer in shade during prolonged boiling of the acid dyebath. This stability in strongly acid dyebaths, together with its level dyeing and light fastness properties, renders it of special interest for the dyeing of carpet yarns. The same combination of properties also makes it of great value for the dyeing of dress goods, cotton and viscose effect threads being left practically unstained, whilst its fastness to washing and perspiration, both of which rank as good—very good, indicate its value to dyers of hosiery and knitted goods. The dyestuff possesses very good penetrative properties and is, therefore, adapted for the dyeing of wool and fur felt hoods.

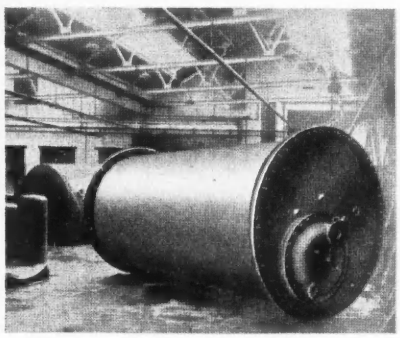
An Addition to the Thionol Range

Thionol Orange 6RS is a homogeneous sulphide dyestuff possessing very good level dyeing and penetration properties and is of interest for the production of bright reddish orange shades of good general fastness on all types of cotton, linen and viscose materials. In addition, it possesses very good solubility and is, therefore, suitable for the dyeing of cops and cheeses in circulating machines. It is suitable for use in self shades and also in combination shades for the production of golden browns, khakis and tans, and is of particular interest for the dyeing of cotton gloves, Government drills, duck cloth, warps for mohair linings and union gabardines, velvets and cords and simiar materials where good fastness to water, washing, perspiration, cross-dyeing and rubbing is required. It is also suitable for application to materials which subsequently have to be rubber-proofed, as it withstands the vulcanising treatment satisfactorily. Although the shade becomes considerably duller when the dyed material is subjected to a copper-bichrome after-treatment there is, at the same time, a very marked improvement in the light fastness.









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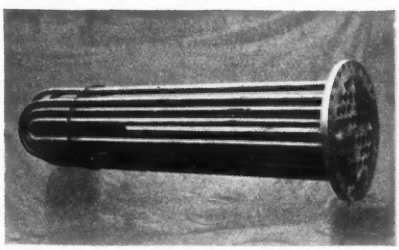

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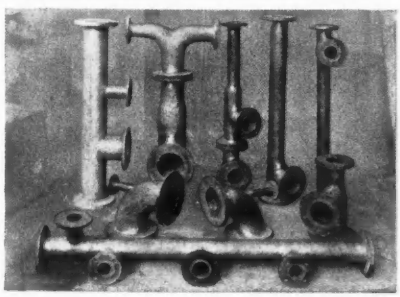

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New Technical Books

FLOTATION PLANT PRACTICE. By Philip Rabone. Second Edition. Pp. 165. Mining Publications, Ltd. 10s. 6d.

The period that has elapsed since the publication of the first edition of this book has been marked by steady progress rather than by radical changes in milling methods. The greatest development that has taken place has been in the flotation of gold ores, and this section has been completely rewritten. Descriptions of a few new machines and circuits of importance have been added, but otherwise only minor alterations have been made.

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FUNDAMENTALS OF DAIRY SCIENCE. By Associates of Lore A. Rogers, Research Laboratories, Bureau of Dairy Industry, United States Department of Agriculture. Second Edition. Pp. 616. Reinhold Publishing Corporation (Chapman and Hall, Ltd.). 86.

This book has been written to fill a need experienced by advanced students and research workers in the field of dairy science. An effort has been made to present basic data, fundamental observations, and unbiased discussions of researches that contribute to the present status of the dairy industry. Matter has been arranged in such a way as to bring together topics considered from the same scientific angle rather than to group them under the more usual headings of specific products of dairy manufacture. It is hoped that one result of publication will be to stimulate research along lines now lagging, thereby correcting somewhat the lack of balance in our knowledge of the scientific basis of the dairy industry.

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ANNUAL REPORTS ON THE PROGRESS OF CHEMISTRY FOR 1935. Vol. xxxii. Pp. 527. The Chemical Society. 10s. 6d.

This present issue of these useful reports commence with a section devoted to "Radioactivity and Subatomic Phenomena" (H. J. J. Braddick), from which it is evident that very rapid progress has been made in the study of artificial disintegration. Transformations among the lighter elements have been in many cases so inter-related that one can now speak of nuclear reactions and a nuclear chemistry. The use of neutrons as bombarding particles and the development of the "slow neutron" process have led to side developments in transmutation among the heavier elements. Some progress has also been made in the study of the β-ray transformation and of the penetrating radiation. For "General and Physical Chemistry" (C. B. Allsopp, S. Glasstone, E. B. Maxted, E. A. Moelwyn-Hughes and G. B. B. M. Sutherland) the choice of subjects has of necessity been dictated by personal, as well as by scientific, considerations. In spectroscopy, for instance, the spectra of polyatomic molecules and of deuterium compounds are the main considerations, since important advances have been made in these directions. As there has been no specific consideration of surface chemistry for some years certain aspects of this subject are also discussed. In the section on "Inorganic Chemistry" (S. R. Carter, E. S. Hedges and W. Wardlaw) it is recorded that important extensions have been made to the fundamental chemistry of common elements such as nitrogen and sulphur, the utilisation of improved appliances and new experimental technique having resulted in the isolation of a number of simple derivatives of great theoretical interest; the application of modern theoretical ideas to the problems of valency and chemical combination has also brought striking developments in the field of molecular structures. "Organic Chemistry" (E. H. Farmer, E. L. Hirst, R. P. Linstead, S. Peat, F. S. Spring and E. E. Turner) is sub-divided to cover stereochemistry, polymerisation (which has attracted a good deal of attention owing to the industrial importance of high molecular materials), carbohydrates (in which there is unabated interest), carotenoids (where recent investigations have been of a consolidating nature), carbocyclic components, terpenes, heterocyclic components, and the porphyrin group (wherein great advances have been made during the last few years). The year has also seen steady progress in "Biochemistry" (A. G. Pollard, C. P. Stewart and J. Stewart), and it is a matter for regret that limitations of space forbid mention of more than a relatively small number of the advances which have been made. In the section devoted to "Analytical Chemistry" (G. U. Houghton, L. S. Theobald and R. W. West) physical methods of analysis, which have formed the subject of special monographs in the last two reports, have been omitted, whilst other subjects, such as colorimetry and mineral analysis have been left for inclusion in a later report. In the present survey, however, it has been considered advisable to devote a special section to water analysis, which was last dealt with as a separate subject in the annual reports for 1926.

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ESSENTIAL PRINCIPLES OF ORGANIC CHEMISTRY. By Charles S. Gibson. Pp. 548. Cambridge University Press. 18s.

It is hoped that this book will facilitate the study of organic chemistry for those who will eventually specialise in the subject, and for those who will later engage in the study of those sciences where a knowledge of the principles of organic chemistry is essential. It is assumed that the reader has some familiarity with the elementary principles of general chemistry and physics and, to avoid elaboration of detail, no attempt has been made to attain the comprehensiveness of a "text-book." For the mode of presentation of certain parts of the subject, the author has made use of some methods adopted by other teachers, particularly Professor G. Barger, F.R.S., author of "Organic Chemistry for Medical Students.' The practical side of the subject is specially emphasised. Types of apparatus commonly used in the preparation and investigation of organic compounds are described in an appendix.

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THE THERMOCHEMISTRY OF THE CHEMICAL SUBSTANCES. By F. Russell Bichowsky and Frederick D. Rossini. Pp. 460. Reinhold Publishing Corporation (Chapman and Hall, Ltd.). 35s.

The assembly of the table of values for the heats of formation in the section on thermochemistry in the International Critical Tables was the first attempt ever made to collate all the published daa involving heats of reaction and to prepare therefrom a self-consistent table of "best" values for the heats of formation of the chemical substances. The present book is a complete revision and extension of that original work. There are four main sections: (1) the introduction or explanatory part; (2) the table of heats of formation, which is the fruit of the work; (3) the text, in which the original published data are cited and discussed; and (4) the list of references to the literature, which includes references to all the published data bearing on thermochemistry. The introduction gives all the necessary information concerning the units, symbols, abbreviations, methods of utilising the table, etc. The table of values contains a list of all the chemical substances (except carbon compounds containing more than 2 carbon atoms), for which there are thermochemical data, together with values for the heats of formation (or heat of transition, fusion, or vaporisation) of each substance. There are listed in the table 5,840 values of heats of formation, and 350 values of heats of transition, fusion, vaporisation, or reaction, for substances for which no values are given for the heat of formation. In the list of references are given the citations to the literature for all the published works bearing on thermochemistry which are discussed or mentioned in the text. This list of 3,730 references includes all the publications covered by "Chemical Abstracts" up to January 1, 1931, and nearly all of the important and significant contributions which have been published in the period from January 1, 1931, to January 1, 1934.

Personal Notes

DR. H. C. BROWN, managing director of the West Norfolk Farmers Manure and Chemical Co-operative Co., Ltd., has been elected Mayor of King's Lynn for Coronation year.

PROFESSOR G. I. FINCH has had conferred upon him the title of Professor of Applied Chemistry in respect of the post held by him at the Imperial College.

MR. RALPH N. WILLS was elected chairman at the annual meeting of the Bristol Paint, Colour and Varnish Manufacturers' Association, on Monday. Mr. F. R. R. Rudman was appointed vice-chairman.

LORD DUDLEY GORDON, managing director of J. and E. Hall, Ltd., refrigerating machinery makers, of Dartford, has been elected president of the British Engineers' Association. He is a past president of the British Association of Refrigeration.

MR. FRANK C. WHITMORE, of the School of Chemistry and Physics of Pennsylvania State College, has been awarded the William H. Nichols Medal of the New York Section of the American Chemical Society for 1937. The honour goes to Mr. Whitmore "for his studies in metallo-organic compounds, especially those of mercury, and in the field of aliphatic chemistry, particularly in molecular rearrangements and in the polymerisation of olefins." The medal will be presented at a meeting of the New York Section on March 5, 1937.

MR. J. MORTON LEWIS, managing director of the Gas Purification Co., with which he had been connected for 36 years, has died at the age of 50.

MR. J. REID, chief chemist at Dalzell Steel Works, Motherwell, has retired. On leaving the firm, Mr. Charteris, his successor, presented him on behalf of the staff and employees with a number of shares in Colvilles, Ltd.

MR. T. C. J. BURGESS, chairman and joint managing director of the London and Thames Haven Oil Wharves, Ltd., has been appointed chairman of the Irish National Refineries, Ltd., a new undertaking which has secured a big site for a refinery at Northwall, at the mouth of the River Liffey.

MR. PATRICK H. KIRKALDY has, for reasons of health, retired from the hon. treasurership of the Institute of Chemistry after twelve years' service. His successor is Mr. Bernard F. Howard, son of the late Mr. David Howard, who was treasurer from 1885 to 1903 and subsequently president until 1906. Mr. Kirkaldy has taken Mr. Howard's place as a member of the Council.

MR. A. HOME-MORTON, who retired some time ago from the managing directorship of the Hoffman la Roche Chemical Works, Ltd., Palmers Green, was elected a member of the Southgate Borough Council on Monday. Mr. Home-Morton is a past president of the London Rotary Club.

DR. ALBERT E. HAFFNER, research chemist, Gas Light and Coke Co., has been awarded the first Arthur Duckham Research Fellowship, value £350 per annum, by the council of the Institution of Gas Engineers, on the recommendation of the Arthur Duckham Memorial Fund Committee. Dr. Haffner goes, this week, to the Gas Institute, Karlsruhe, to carry out, under the direction of Professor Dr. Karle Bunte, carry out research under the direction of Professor Dr. Karle Bunte.

Chemical Notes from Foreign Sources

Roumania

THE MANUFACTURE OF OLEIN has been commenced by the Hermes concern at Bucharest.

BUTANE MANUFACTURE HAS BEEN COMMENCED by the Astra Romana at the rate of 7,000 tons per annum.

ZINC OXIDE AND ZINC SULPHATE are among the principle products to be made at a new chemical works recently established at Klausenberg.

Italy

A CONCESSION HAS BEEN GRANTED to the Soc. Acetati e Derivati of Milan for construction of an acetone cyanohydrin plant at Novara.

Japan

THE PRODUCTION OF PHENOL AND CRESOL FORMALDEHYDE PLASTICS is being planned by the Yedogawa Kogyosho, employing formaldehyde from its own works and phenol and cresol from the Mitsubishi concern.

France

RECENT COMPANY FORMATIONS include: Gallion, 11 bis Rue Amélie (capital 50,000 francs), manufacture and sale of natural and synthetic perfume essences; Soc. de Protection contra les gaz "Le Gallus," 62 Rue Beaubourg, Paris (capital 30,000 francs), sale of gas masks.

Austria

THE JAPANESE MITSU TRADING CONCERN, as reported in the Vienna Press, has established a branch in that city as an organising centre for export of Japanese chemicals to the neighbouring countries
industry.

China

A PAPER WORKS IS BEING CONSTRUCTED near Taku by the Toyō Paper Co. Another Japanese firm also proposes to erect a paper factory in the former Belgium concession in Tiensin, utilising reeds from Southern Manchuria and Hopei.

Belguim

THE HEALTHY TONE OF THE COBALT MARKET was commented upon in the annual report of the Soc. Générale Metallurgique de Hoboken. Although no improvement could be effected in respect of sales of arsenic compounds the factory at Reppel could be maintained in normal production owing to the necessity for eliminating arsenic from many of the company's other products.

THE COMPAGNIE BELGE POUR LES INDUSTRIES CHIMIQUES reports a balance of over 500,000 francs for the 1935-36 trading year and is distributing a dividend of 1.20 francs per share.

Jugoslavia

CHROMIUM DEPOSITS with the high content of 45 to 50 per cent. chromium, apart from copper and silver, are being mined near Planinica by a German-Jugoslavian company which is exporting the ore exclusively to Germany.

Poland

MOTOR TYRES ARE TO BE MANUFACTURED for the Polish market by the firm of Stornil S.A., in Posen.

A LICENCE HAS BEEN GRANTED to a Polish textile group by the Snia Viscosa to operate the lanital process for the manufacture of casein artificial wool. In this connection a company has been formed, with a share capital of 4 million zloty, under the auspices of the firms of Wola and Scheibler and Grohmann (representing the textile industry), and Director Piasecki of the Boruta concern (representing the chemical industry). It is hoped to commence production early in 1937 with an annual output of 1,100 tons, to be increased later to 3,500 tons.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Open to Public Inspection

MANUFACTURE OF COLOURED MASSES.—Soc. of Chemical Industry in Basle. Aug. 13, 1934. 455,320.

PREPARATION OF CELLULOSE ETHERS.—Rohm and Haas Co. Oct. 26, 1934. 455,253.

NON-CAKING GRANULAR SUGAR.—National Sugar Refining Co. of New Jersey. July 25, 1935. 455,062.

CONCENTRATION OF ALIPHATIC ACIDS.—British Celanese, Ltd. Oct. 5, 1934. 455,325.

MANUFACTURE OF ARTIFICIAL RESINS.—Herbig-Haarhaus, A.-G. Nov. 30, 1934. 455,066.

POLYMERS OF OLEFINES.—Standard Oil Development Co. Dec. 8, 1934. 455,114.

PRODUCTION OF ANTIMONY OXIDE.—E. L. W. Byrne (American Smelting and Refining Co.). Dec. 13, 1935. 455,181.

PURIFYING GRAPHITE.—British Thomson-Houston Co., Ltd. Jan. 5, 1935. 455,185.

PRODUCTION OF MAGNESIUM HYDROXIDE.—H. H. Chesny and Marine Chemicals Co., Ltd. Feb. 7, 1936. 455,335.

DESULPHURISATION OR SIMULTANEOUS DESULPHURISATION and dephosphorisation of steel.—Soc. D'Electro-Chimie, D'Electro-Metallurgie, et des Acieries Electriques D'Ugine. March 7, 1935. 455,070.

TREATMENT OF GASES EVOLVED IN CARBONISING or gasefying plants.—Woodall-Duckham (1920), Ltd. (Didier-Werke, A.-G.). March 17, 1936. 455,195.

MANUFACTURE OF ESTERS of polycyclic alcohols.—Schering-Kahlbaum, A.-G. April 8, 1935. 455,264.

PRODUCTION OF ESTERS OF CELLULOSE.—British Celanese, Ltd. Sept. 29, 1934. 455,344.

BOROSILICATE GLASS CONTAINING CERIUM.—Corning Glass Works. July 30, 1935. 455,082.

ASSISTANTS FOR USE IN THE TEXTILE, leather, paper, and like industries.—I. G. Farbenindustrie. April 21, 1934. 455,310.

PRODUCTION OF VALUABLE HYDROCARBONS by treatment with hydrogenating gases of distillable carbonaceous materials.—International Hydrogenation Patents Co., Ltd. June 14, 1934. 455,313.

MANUFACTURE OF STARCH.—Merco Centrifugal Separator Co., Ltd., A. Peltzer, and A. Peltzer, jun. June 29, 1935. 455,158.

PROCESS OF MANUFACTURING MOTOR FUELS of high anti-knock value.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. April 24, 1935. 10/54/36.

PROCESS OF TREATING CARBONACEOUS COMPOUNDS.—Gewerkschaft Auguste. April 26, 1935. 107876/36.

PROCESS FOR EFFECTING THE CATALYTIC DEHYDROGENATION of hydrocarbons.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. April 26, 1935. 10947/36.

MANUFACTURE OF DIAZOAMINO COMPOUNDS.—Compagnie Nationale de Matieres Colorantes et Manufactures de Produits Chimiques du Nord Reunies Etablissements Kuhlmann. April 20, 1935. 11107/36.

PROCESS FOR THE PRODUCTION OF ALUMINA practically free from silicic acid from alkaline-earth aluminates.—Lonza Elektrizitatswerke und Chemische Fabriken A.-G. April 20, 1935. 11146/36.

MANUFACTURE OF HIGHLY CONCENTRATED SULPHURIC ACID.—W. Schefczik. April 20, 1935. 11188/36.

RECOVERY OF HYDROCARBONS from gases containing the same.—I. G. Farbenindustrie. April 20, 1935. 11263/36.

MANUFACTURE OF ACRIDINIUM COMPOUNDS.—I. G.Farbenindustrie. April 20, 1935. 11270/36.

CLEANING AND PICKLING OF METALS.—Grasselli Chemical Co. April 24, 1935. 11772/36.

MANUFACTURE OF A NEW PHENOL DERIVATIVE and its use for the preparation of mineral oil compositions.—Socony-Vacuum Oil Co., Inc. April 26, 1935. 11961/36.

Specifications Accepted with Date of Application

PRODUCTION AND USE OF BASE-EXCHANGE MATERIALS.—R. Furness, and J. Crosfield and Sons, Ltd. Jan. 14, 1935. 455,374.

MANUFACTURE AND APPLICATION OF SUBSTANCES having capillary activity.—W. W. Groves (I. G. Farbenindustrie). Jan. 15, 1935. 455,379.

MANUFACTURE OF WATER-SOLUBLE CONDENSATION PRODUCTS.—W. W. Groves (I. G. Farbenindustrie). Feb. 21, 1935. 455,491.

FUMIGANT COMPOSITIONS and the manufacture thereof.—J. Ferguson, H. Pirie, and Imperial Chemical Industries, Ltd. Feb. 23, 1935. 455,605.

PRODUCTION OF ANDROSTERONES.—W. P. Williams (Pfeilring-Werke, A.-G.). Mar. 16, 1935. 455,378.

HEAT-HARDENING OF SYNTHETIC RESINS ON FABRICKS.—Johnson and Johnson (Great Britain), Ltd. (Johnson and Johnson). Mar. 21, 1935. 455,496.

PRODUCTION OF APPROXIMATELY NEUTRAL or reducing atmospheres containing carbon dioxide and carbon monoxide, and apparatus therefor.—Brayshaw Furnaces and Tools, Ltd., S. N. Brayshaw, and F. Rushton. April 16, 1935. 455,436.

PRODUCTION OF DISINTEGRATED PEAT.—N. Testrup, T. Gram, P. Hartmann, and Techno-Chemical Laboratories, Ltd. April 17, 1935. 455,609.

PRODUCTION OF COKE or semi-coke by carbonising coal-oil mixtures.—H. P. Stephenson, and R. G. Israel. April 18, 1935. 455,558.

BLEACHING AND GERMICIDAL COMPOSITIONS and processes of using the same.—Albright and Wilson, Ltd. April 19, 1934. 455,611.

MANUFACTURE OF 4-HYDROXYPRENE.—I. G. Farbenindustrie. April 19, 1934. 455,621.

PROCESS FOR SAPONIFYING MATERIALS made from cellulose esters. Aceta Ges. April 21, 1934. 455,622.

METHOD AND DEVICE FOR MECHANICALLY TREATING THIXOTROPES.—I. G. Farbenindustrie. April 21, 1934. 455,624.

PRODUCTION OF HYDROQUINONES.—Kodak, Ltd. April 25, 1934. 455,692.

DELUSTRED ARTIFICIAL SILK.—Imperial Chemical Industries, Ltd., and H. D. Mudford. April 25, 1935. 455,642.

MANUFACTURE AND APPLICATION OF AZO DYESTUFFS.—Imperial Chemical Industries, Ltd., and A. H. Knight. April 25, 1935. 455,643.

MANUFACTURE OF AZINE DYESTUFFS.—Imperial Chemical Industries, Ltd., and F. H. S. Curd. April 25, 1935. 455,693.

MANUFACTURE OF HALOGEN DERIVATIVES OF RUBBER.—Imperial Chemical Industries, Ltd., and J. G. Moore. April 25, 1935. 455,644.

RECOVERY OF AMMONIA FROM COAL AND LIKE GASES.—Institution of Gas Engineers, and A. Key. April 26, 1935. 455,648.

PRODUCTION OF PLASTICISED CELLULOSE ESTER COMPOSITIONS.—Imperial Chemical Industries, Ltd. April 26, 1934. 455,654-5.

SULPHONAMIDE COMPOUNDS.—British Celanese, Ltd., and W. H. Moss. April 27, 1935. 455,694.

PROCESSES AND APPARATUS FOR SPLITTING HYDROCARBONS.—Gutehoffnungshütte Oberhausen, A.-G. May 5, 1934. 455,505.

PRODUCTION OF CELLULOSE ESTERS and products of same.—W. H. A. Thiemann (Wolff and Co. Kommandit-Ges. Auf Aktien). May 9, 1935. 455,657.

PRODUCTION OF VALUABLE HYDROCARBONS rich in hydrogen.—H. E. Potts (International Hydrogenation Patents Co., Ltd.). Aug. 1, 1935. 455,453.

MANUFACTURE AND PRODUCTION OF CHLORIDES of polycarboxylic acids.—G. W. Johnson (I. G. Farbenindustrie). Aug. 12, 1935. 455,668.

GLASSES RESISTANT TO ALKALI METAL VAPOURS and method of making them.—Corning Glass Works. Nov. 6, 1934. 455,460.

PRODUCTION OF RAW RUBBER with a low content of non-rubber constituents.—Metallges, A.-G. Dec. 24, 1934. 455,674.

MANUFACTURE OF ACETYLENE.—Standard Oil Development Co. Dec. 29, 1934. 455,567.

CONTINUOUS NITRATION OF AROMATIC HYDROCARBONS.—J. Meissner. Nov. 28, 1934. 455,570.

PROCESS AND APPARATUS for the production of cuprammonium silk.—A. Wagner. June 8, 1935. 455,534.

LATEX COMPOSITIONS.—E. Stern. Dec. 2, 1935. 455,538.

PROCESS FOR ELECTROLYTIC PRODUCTION OF ESTERS.—Nitroglycerin Aktiebolaget. Dec. 10, 1934. 455,463.

PROCESS OF CRACKING HYDROCARBON COMPOUNDS.—Naamlooze Vennootschap Nieuwe Octrooi Maatschappij. April 4, 1935. 455,421.

CONCENTRATION OF LIQUIDS.—A. R. Jahn. April 8, 1936. 455,581.

APPARATUS FOR THE ELECTROLYSIS of aqueous solutions of sodium sulphate.—I. G. Farbenindustrie. Oct. 4, 1935. 455,429.

MEANS FOR AFFORDING PROTECTION AGAINST TOXIC GASES or the like.—C. H. Gill. May 12, 1936. 455,593.

MANUFACTURE OF MULTI-CELLULAR GLASS.—Soc. Anon. de Manufactures des Glaces et Produits Chimiques de St.-Gobain, Chauny, and Cirey. June 5, 1935. 455,594.

PROCESS OF TANNING HIDES AND SKINS.—W. W. Groves (I. G. Farbenindustrie). Jan. 21, 1935. 455,695-6.

Applications for Patents

(October 22 to 28 inclusive.)

TREATMENT OF ZINC OXIDES.—Amalgamated Oxides, Ltd., and A. G. Elliott. 29071.

MANUFACTURE OF CITRIC ACID, ETC.—S. Bakonyi. 29348.

PRODUCTION OF COMPOUNDS OF THE PARIS GREEN TYPE.—S. Balint. (Hungary, Oct. 26, '35.) 29063.

APPARATUS FOR TREATING CHARCOAL, ETC.—Blairs, Ltd. 28819.

MANUFACTURE OF CONDENSATION PRODUCTS from aminotriazines. A. G. Bloxam (Soc. of Chemical Industry in Basle). 29303.

MANUFACTURE, ETC., OF CELLULOSE DERIVATIVES.—British Celanese, Ltd. (United States, Nov. 21, '35.) 29274.

MANUFACTURE OF OXYGENATED ORGANIC COMPOUNDS.—British Celanese, Ltd. (United States, Nov. 19, '35.) 29275.

REFINING OF PARAFFIN WAX.—Burmah Oil Co., Ltd., and C. R. S. Harley. 28769.

SEPARATION, ETC. BY LIQUITION AND DISTILLATION.—E. L. W. Byrne (American Smelting and Refining Co.). 29085.

MANUFACTURE OF ARTIFICIAL MASSES.—A. Carpmael (I. G. Farbenindustrie.) 29206.

PREPARATION OF A CONDENSATION PRODUCT of iodoform and guaiacol. Chinoin Gyógyszer Es Vegyészeti Termékek Gyára Részvénytársaság (Dr. Kereszty and Dr. Wolf). (Hungary, Nov. 6, '35.) 29212.

PREPARATION OF A CONDENSATION PRODUCT of iodoform and guaiacol. Chinoin Gyógyszer Es Vegyészeti Termékek Gyára Részvénytársaság (Dr. Kereszty and Dr. Wolf). (Hungary, Nov. 6, '35.) 29213.

PREPARATION OF A CONDENSATION PRODUCT of iodoform and guaiacol. Chinoin Gyógyszer Es Vegyészeti Termékek Gyára Részvénytársaság (Dr. Kereszty and Dr. Wolf). (Hungary, April 28). 29214.

CATALYTIC ORGANIC SYNTHESES.—E. I. du Pont de Nemours and Co. (United States, Oct. 26, '35.) 29114, 29115.

CHEMICAL TREATMENT OF MATERIALS by liquid reagents.—Filtrators, Ltd., V. V. Saks, and L. W. Stubbs. 29025.

SYNTHESIS RESINS.—C. F. Griffiths and G. T. Morgan. 28813.

MANUFACTURE OF MIXED POLYMERISATION PRODUCTS soluble in benzene.—W. W. Groves (I. G. Farbenindustrie.) 28720.

PROCESS FOR COLOURING, ETC. STRUCTURES produced from highly polymeric organic bodies.—W. W. Groves (I. G. Farbenindustrie.) 28960.

MANUFACTURE OF ARTIFICIAL MASSES from polyvinyl halides.—I. G. Farbenindustrie. (Germany, Oct. 26, '35.) 28723.

MANUFACTURE OF SYNTHETIC PRODUCTS.—Imperial Chemical Industries, Ltd., and H. Dodd. 29116.

POLYMERISATION OF HYDROCARBONS.—Imperial Chemical Industries, Ltd., J. G. Paton and E. G. Williams. 29365.

ANTHRAQUINONE DYESTUFFS.—Imperial Chemical Industries, Ltd., and F. Lodge. 29366.

PRODUCTION OF COMPOUNDS of the pyrimidine series.—G. W. Johnson (I. G. Farbenindustrie.) 29064.

NEUTRALISING CHROME LEATHER.—G. W. Johnson (I. G. Farbenindustrie.) 29065.

PRODUCTION OF POLYMERISED OILS.—Kodak, Ltd. (Eastman Kodak Co.). 28810.

PROCESS OF MOLECULAR, ETC. DISTILLATION.—Kodak, Ltd. 28811.

TREATMENT OF FATS, ETC.—P. R. E. Lewkowitsch. 28716.

INSECTICIDES.—K. Mackenzie. 29040.

PROCESS FOR EXTRACTING LIQUID MIXTURES.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (United States, Oct. 26, '35.) 29107.

TREATMENT OF LUBRICANTS.—Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. (Holland, Oct. 31, '35.) 29108.

PIGMENTS.—Orr's Zinc White, Ltd., W. E. Ireland and H. Mills. 29005.

PRODUCTION OF ORTHO-PHOSPHORIC ACID from rock phosphate.—H. Pincas. 29163.

PRODUCTION, ETC. OF PETROL.—H. E. Potts (International Hydrogenation Patents Co., Ltd.). 29120.

CONCENTRATION OF LATEX.—Rubber Producers' Research Association (Rhodes and Sekaran). 28735.

MANUFACTURE OF HYDROXY ACIDS, ETC. of the cyclopentanophenanthrene series.—Schering-Kahlbaum, A.-G. (Germany, Oct. 24, '35.) 28905.

MANUFACTURE OF MIXED SUBSTITUTED ORGANIC MERCURY COMPOUNDS.—Schering-Kahlbaum, A.-G. (Germany, Oct. 28, '35.) 29344.

SILICATE CEMENTS.—F. D. Snell, Inc. (United States, Feb. 29.) 28913.

PROCESS FOR CARRYING OUT CONDENSATION REACTIONS.—W. J. Tennant (Henkel and Cie, Ges.). 29208.

METHODS OF RECOVERING SOLVENT IN DEWAXING OPERATIONS.—Texaco Development Corporation. (United States, Nov. 14, '35.) 28854.

PROCESS FOR SOFTENING WATER, ETC.—W. W. Triggs (Rumford) Chemical Works). 28821.

MANUFACTURE OF ALKYL DERIVATIVES of animated aromatic hydrocarbons.—United States Industrial Alcohol Co. (United States, Oct. 22, '35.) 28730.

MANUFACTURE OF ALYKL DERIVATIVES of animated aromatic hydrocarbons.—United States Industrial Alcohol Co. (United States, Sept. 22.) (Cognate with 28730.) 28731.

Chemical and Allied Stocks and Shares

THERE has been a further increase of activity reported in the stock and share markets since the beginning of the new Stock Exchange account on Monday. Distillers continued to hold their recent further rise to 112s. 6d. and Turner and Newall, which were again active, moved up from 101s. 6d. to 103s. The market is taking the view that this company may receive good contracts for asbestos in connection with the lessening of noise on the underground railways. British Oxygen were more prominent, the statement which accompanied the interim dividend announcement having led to the belief that a further bonus of some kind may be in prospect. Murex were steady and continue to be held firmly as it is assumed in many quarters that bonus possibilities are also not exhausted in this case. Imperial Chemical were steady and are in fact unchanged on the week at 41s. 7½d. Goodlass Wall and Lead Industries continued in larger demand on the rise in the price of lead and made the moderately higher figure of 15s.

British Drug Houses retained the better tendency which developed recently, but there was some profit-taking in Timothy Whites and Taylors, which have gone back from 35s. to 33s. 9d. although there are continued expectations in the market that a larger dividend will be announced on these 5s. shares shortly. Boots Pure Drug were little changed, but South African Druggists were again active at higher prices, there being expectations that the dividend for the initial period will be brought up to at least 15 per cent. Sangers were steady; in this case the disposition in the market is to budget for a further increase in dividend, granted that additional capital is not required for continued expansion of the business, in which case shareholders would probably have another offer of more shares on favourable terms. There was again a good deal of attention given to the 5s. ordinary shares of Greeff-Chemicals Holdings which changed hands around 9s. 4½d.; it is possible a maiden dividend may be announced shortly.

Monsanto Chemicals 5½ per cent. preference were again steady with business recorded around 22s. 3d.; mention has been made before of the good cover for the diivdend requirements of these shares. British Glues and Chemicals 4s. ordinary shares were active up to 9s. 3d. on the possibility of a good increase in dividend. British Industrial Plastics 2s. shares were again around 4s. Fison, Packard and Prentice made the lower price of 44s., but were steadier following the statements at the meeting. Larger demand was reported for the ordinary shares of Imperial Smelting and the price was higher at 17s. 4½d. the dividend devision should be announced shortly.

Consett Iron remained in active demand and Dorman Long have risen further on the belief that the past year's results will create a good impression. Richard Thomas also rose to a higher figure, awaiting the impending interim dividend announcement. Stewarts and Lloyds responded to news of the decision to reopen the old works at Rutherglen and Tube Investments were steady, awaiting publication of the full results for the past year. Vickers were favoured on the growing belief that the directors may have in mind a further bonus in the form of a writing up of the nominal value of the 10s. ordinary units to £1. Cannon Iron Foundries were steady on expectations of a favourable increase in the rate of dividend and International Combustion also maintained a good tendency on the anticipations attaching to the results.

Wall Paper deferred units failed to benefit from the maintenance of the dividend at 12½ per cent. the market having been disappointed with the reduced profits shown by the preliminary statement. British Celanese issues were not affected a great deal by the past year's results, although the payment proposed on account of the arrears of second preference dividend is taken in the market to indicate that the directors expect the company's progress will be accelerated. Courtaulds were steady.

Lewis Berger were moderately lower, a larger increase in dividend having been anticipated in the market. The payment is to be raised by 1 per cent. to 16 per cent., and it is probable that the full report will show the larger payment to be conservative. Pinchin Johnson were again active on the possibilities of an eventual bonus, while International Paint were good on the belief that the demand for marine paints will expand.

Associated Portland Cement were fairly well maintained on the confident belief that the large scale schemes of road development will give an important stimulus to the demand for cement for some time to come. Some market men are already taking the view that the dividend for the current year may be raised to 25 per cent. British Plaster Board failed to benefit materially from the maintenance of the interim dividend. Oil shares remained less prominent, awaiting the "Shell" interim dividend decision which is expected this month.

Weekly Prices of British Chemical Products

NO price changes have been reported in the general chemical market this week. Unless otherwise stated, the prices below cover fair quantities net and naked at sellers' works.

MANCHESTER.—Relatively quiet conditions have obtained during the past week in most sections of the Manchester chemical market. For the most part consumers tend to limit fresh commitments at the moment to quantities which are sufficient to tide them over short periods and not a great deal in the way of new contract buying has been experienced. The placing of forward contracts for delivery during next year cannot, however, be delayed much longer and the next few weeks should witness a pronounced increase in activity in this respect. From the point of view of the movement into consumption against contracts, the general position in and around Manchester is satisfactory and fair quantities of textile and other industrial chemicals are being called for locally. Among the tar products conditions are fairly active on the whole and in some of the light materials a firmer tendency of prices has been reported here during the past week.

GLASGOW.—There has been a slight improvement in the demand for chemicals for home trade during the week, but export inquiries are still very limited. Owing to certain movements in regard to caustic soda there is a tendency for buying to drop off in various grades of this material. Prices generally continue steady at about previous figures; lead, copper and zinc products being very firm in sympathy with the metals. A generally firm feeling has prevailed in the coal tar by-products group throughout the week. There is evidence of several fresh contracts having been placed for creosote for export, and washed oils are moving rather better than for some time. Pitch seems a little firmer, although still within the range 30s. to 35s. per ton f.o.r. in bulk. Lighter pyridine fractions have advanced about 1s. per gallon, with the demand in excess of present local production. Only a limited volume of fresh business in cresylic acid has been transacted, and carbolic acids are rather quieter.

General Chemicals

ACETONE.—£62 to £65 per ton; SCOTLAND: £64 to £65 ex wharf, according to quantity.

ACID, ACETIC.—Tech., 80%, £30 5s. to £32 5s. per ton; pure 80%, £32 5s. to £34 5s.; tech., 40%, £16 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. SCOTLAND: Glacial 98/100%, £48 to £52; pure 80%, £32 5s.; tech., 80%, £30 5s., d/d buyers' premises Great Britain. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.

ACID, BORIC.—Commercial granulated, £27 per ton; crystal, £28; powdered, £29; extra finely powdered, £31; packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. B.P. cryst., £36; B.P. powder, £37. SCOTLAND: Crystals, in 1 cwt. bags, £28; powdered, in 1 cwt. bags, £29.

ACID, CHROMIC.—Flaked, 10d. per lb., less 2½%; ground, 10¼d. per lb., less 2½%, d/d U.K.

ACID, CITRIC.—1s. per lb. MANCHESTER: 11¾d. to 1s. SCOTLAND: B.P. crystals, 1s. per lb., less 5%.

ACID, CRESYLIC.—97/99%, 3s. to 3s. 1d. per gal.; pale, 98%, 3s. 1d. to 3s. 2d.; dark, 2s. 6d. to 2s. 7d.; 99/100%, refined, 3s. 4d. to 3s. 6d. per gal. MANCHESTER: 99/100%, pale, 3s. 7d.

ACID, FORMIC.—85%, in carboys, ton lots, £42 to £47 per ton.

ACID, HYDROCHLORIC.—Spot, 4s. to 6s. carboy d/d according to purity, strength and locality. SCOTLAND: Arsenical quality, 4s.; dearsenicated, 5s. ex works, full wagon loads.

ACID, LACTIC.—LANCASHIRE: Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50% by vol., £41. One-ton lots ex works, barrels free.

ACID, NITRIC.—80° Tw. spot, £18 to £25 per ton makers' works. SCOTLAND: 80°, £24 ex station full truck loads.

ACID, OXALIC.—£48 15s. to £57 10s. per ton, according to packages and position. SCOTLAND: £2 9s. 6d. per cwt. in casks. MANCHESTER: £49 to £54 10s. per ton ex store.

ACID, SULPHURIC.—SCOTLAND: 144° quality, £3 12s. 6d.; 168°, £7; dearsenicated, 20s. per ton extra.

ACID, TARTARIC.—1s. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. SCOTLAND: 11¾d. less 5%. MANCHESTER: 11¾d. to 1s. per lb.

ALUM.—SCOTLAND: Ground, £10 2s. 6d. per ton; lump, £9 12s. 6d.

ALUMINA SULPHATE.—LONDON: £7 10s. to £8 per ton. SCOTLAND: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 10d. per lb. d/d in cylinders. SCOTLAND: 10d. to 1s. containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

AMMONIUM CARBONATE.—SCOTLAND: Lump, £30 per ton; powdered, £33, in 5-cwt. casks d/d buyers' premises U.K.

AMMONIUM CHLORIDE.—LONDON: Fine white crystals, £18 to £19. (See also Salammoniac.)

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM SULPHATE.—Neutral quality, 20.6% nitrogen, £6 19s. per ton.

ANTIMONY OXIDE.—SCOTLAND: £61 to £65 per ton, c.i.f. U.K. ports.

ANTIMONY SULPHIDE.—Golden, 6½d. to 1s. 1d. per lb.; crimson, 1s. 5½d. to 1s. 7d. per lb., according to quality.

ARSENIC.—LONDON: £13 10s. per ton c.i.f. main U.K. ports for imported material; Cornish nominal, £22 10s. f.o.r. mines. SCOTLAND: White powdered, £17 ex store. MANCHESTER: White powdered Cornish £18 10s. ex store.

ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.

BARIUM CHLORIDE.—£11 per ton.

BARYTES.—£6 10s. to £8 per ton.

BISULPHITE OF LIME.—£6 10s. per ton f.o.a. London.

BLEACHING POWDER.—Spot, 35/37%. £7 19s. per ton in casks, special terms for contracts. SCOTLAND: £9.

BORAX COMMERCIAL.—Granulated, £14 10s. per ton; crystal £15 10s.; powdered, £16; finely powdered, £17; packed in 1-cwt. bags, carriage paid home to buyer's premises within the United Kingdom in 1-ton lots. SCOTLAND: Granulated, £14 10s. per ton in 1 cwt. bags, carriage paid.

CADMIUM SULPHIDE.—3s. 11d. to 4s. per lb.

CALCIUM CHLORIDE.—Solid 70/75% spot, £5 5s. per ton d/d station in drums. SCOTLAND: 70/75% solid, £5 10s. per ton net ex store.

CARBON BISULPHIDE.—£31 to £33 per ton, drums extra.

CARBON BLACK.—3¾d. to 4¾d. per lb. LONDON: 4½d. to 5d.

CARBON TETRACHLORIDE.—SCOTLAND: £41 to £43 per ton, drums extra.

CHROMIUM OXIDE.—10¾d. per lb., according to quantity d/d U.K.; green, 1s. 2d. per lb.

CHROMETAN.—Crystals, 2⅝d. per lb.; liquor, £19 10s. per ton d/d

COPPERAS (GREEN).—SCOTLAND: £3 15s. per ton, f.o.r. or ex works.

CREAM OF TARTAR.—£3 19s. per cwt. less 2½%. LONDON: £3 17s. per cwt. SCOTLAND: £3 19s. 6d. net.

DINITROTOLUENE.—66/68° C., 9d. per lb.

DIPHENYLGUANIDINE.—2s. 2d. per lb.

FORMALDEHYDE.—LONDON: £24 10s. per ton. SCOTLAND: 40%, £25 to £28 ex store.

IODINE.—Resublimed B.P., 5s. 1d. per lb.

LAMPBLACK.—£23 to £24 per ton.

LEAD ACETATE.—LONDON: White, £33 15s. per ton; brown, £1 per ton less. SCOTLAND: White crystals, £34 to £35; brown, £1 per ton less. MANCHESTER: White, £35, brown, £33 10s.

LEAD NITRATE.—£32 10s. to £34 10s. per ton.

LEAD, RED.—SCOTLAND: £32 per ton less 2½%, carriage paid, for 2-ton lots.

LEAD, WHITE.—SCOTLAND: £40 per ton, carriage paid. LONDON: £41.

LITHOPONE.—30%, £16 to £16 5s. per ton.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—SCOTLAND: £7 per ton.

MAGNESIUM SULPHATE.—Commercial, £5 per ton, ex wharf.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

PARAFFIN WAX.—SCOTLAND: 3⅝d. per lb.

PHENOL.—6¾d. to 7½d. per lb.

POTASH, CAUSTIC.—LONDON: £42 per ton. MANCHESTER: £39 10s.

POTASSIUM BICHROMATE.—Crystals and Granular, 5d. per lb. less 5%, d/d U.K. Ground, 5¼d. LONDON: 5d. per lb. less 5%, with discounts for contracts. SCOTLAND: 5d. per lb. less 5% carriage paid. MANCHESTER: 5d.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 4¼d. per lb. MANCHESTER: £38 10s. per ton.

POTASSIUM CHROMATE.—6½d. per lb. d/d U.K.

POTASSIUM IODIDE.—B.P. 4s. 3d. per lb.

POTASSIUM NITRATE.—SCOTLAND: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 8¼d. per lb. SCOTLAND: B.P. Crystals, 8¼d. MANCHESTER: B.P. 10½d. to 11¼d.

POTASSIUM PRUSSIATE.—LONDON: Yellow, 7½d. to 8d. per lb. SCOTLAND: 7d. net, in casks, ex store. MANCHESTER: Yellow, 7½d.

SALAMMONIAC.—First lump spot, £41 17s. 6d. per ton d/d in barrels. SCOTLAND: Large crystals, in casks, £36.

SODA ASH.—58% spot, £5 12s. 6d. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid, 76/77° spot, £13 17s. 6d. per ton d/d station. SCOTLAND: Powdered 98/99%, £17 10s. in drums, £18 5s. in casks, Solid 76/77°, £14 12s. 6d. in drums; 70/73%, £14 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts 10s. per ton less. MANCHESTER: £13 5s. to £14 contracts.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—LONDON: £21 per ton. SCOTLAND: £17 15s. per ton net ex store.

SODIUM BICARBONATE.—Refined spot, £10 10s. per ton d/d station in bags. SCOTLAND: £12 10s. per ton in 1 cwt. kegs, £10 15s. per ton in 2 cwt. bags. MANCHESTER: £10 10s.

SODIUM BICHROMATE.—Crystals cake and powder 4d. per lb. net d/d U.K. discount 5%. Anhydrous, 5d. per lb. LONDON: 4d. per lb. less 5% for spot lots and 4d. per lb. with discounts for contract quantities. MANCHESTER: 4d. per lb. SCOTLAND: 4d., less 5% carriage paid.

SODIUM BISULPHITE POWDER.—60/62%, £20 per ton d/d 1 cwt. iron drums for home trade.

SODIUM CARBONATE, MONOHYDRATE.—£15 per ton d/d in minimum ton lots in 2 cwt. free bags. Soda crystals, SCOTLAND: £5 to £5 5s. per ton ex quay or station. Powdered or pea quality, 7s. 6d. per ton extra. Light Soda Ash, £7 ex quay, min. 4-ton lots with reductions for contracts.

SODIUM CHLORATE.—£29 per ton. SCOTLAND: £1 10s. per cwt.

SODIUM CHROMATE.—4d. per lb. d/d U.K.

SODIUM HYPOSULPHITE.—SCOTLAND: Large crystals English manufacture, £9 5s. per ton ex stations, min. 4-ton lots. Pea crystals, £14 10s. ex station, 4-ton lots. MANCHESTER: Commercial, £10; photographic, £14 10s.

SODIUM IODIDE.—B.P., 6s. per lb.

SODIUM METASILICATE.—£14 per ton, d/d U.K. in cwt. bags.

SODIUM NITRITE.—LONDON: Spot, £18 5s. to £20 5s. per ton d/d station in drums.

SODIUM PERBORATE.—10%, 9¼d. per lb. d/d in 1-cwt. drums. LONDON: 10d. per lb.

SODIUM PHOSPHATE.—£13 per ton.

SODIUM PRUSSIATE.—LONDON: 5d. to 5½d. per lb. SCOTLAND: 5d. to 5¾d. ex store. MANCHESTER: 4½d. to 4¾d.

SODIUM SILICATE.—140° Tw. Spot, £8 per ton. SCOTLAND: £8 10s.

SODIUM SULPHATE (GLAUBER SALTS).—£4 2s. 6d. per ton d/d SCOTLAND: English material, £3 15s.

SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 12s. 6d. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 2s. 6d. to £3 5s.

SODIUM SULPHIDE.—Solid 60/62% Spot, £10 15s. per ton d/d in drums; crystals 30/32%, £8 per ton d/d in casks. SCOTLAND: For home consumption, Solid 60/62%, £10 5s.; broken 60/62%, £11 5s.; crystals, 30/32%, £8 7s. 6d., d/d buyer's works on contract, min. 4-ton lots. Spot solid, 5s. per ton extra. Crystals, 2s. 6d. per ton extra. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8.

SODIUM SULPHITE.—Pea crystals, spot, £13 5s. per ton d/d station in kegs. Commercial spot, £8 15s. d/d station in bags.

SULPHATE OF COPPER.—MANCHESTER: £15 per ton f.o.b. SCOTLAND: £17 15s. per ton less 5%.

SULPHUR.—£9 to £9 5s. per ton. SCOTLAND: £8 to £9.

SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quality.

SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.

VERMILION.—Pale or deep, 5s. 1d. per lb. in 1-cwt. lots.

ZINC CHLORIDE.—SCOTLAND: British material, 98%, £18 10s. per ton f.o.b. U.K. ports.

ZINC SULPHATE.—LONDON: £12 per ton. SCOTLAND: £10 10s.

ZINC SULPHIDE.—10d. to 11d. per lb.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Neutral quality, basis 20.6 per cent. nitrogen, delivered in 6-ton lots to farmer's nearest station, November, £6 19s. per ton; December, £7 0s. 6d. per ton; January, 1937, £7 2s. per ton; February, £7 3s. 6d. per ton; March to June, £7 5s. per ton.

CALCIUM CYANAMIDE.—November, £6 18s. 9d. per ton; December, £7 per ton; January, 1937, £7 1s. 3d. per ton; February, £7 3s. 6d. per ton; March, £7 3s. 9d. per ton; April to June, £7 5s. per ton, carriage paid to any railway station in Great Britain in lots of four tons and over.

NITRO-CHALK.—£7 5s. per ton for delivery to end of June, 1937.

NITRATE OF SODA.—£7 12s. 6d. per ton for delivery up to end of June, 1937.

CONCENTRATED COMPLETE FERTILISERS.—£10 12s. to £11 1s. per ton for delivery up to end of June, 1937, delivered in 6-ton lots to farmer's nearest station.

AMMONIUM PHOSPHATE FERTILISERS.—£10 5s. to £13 15s. per ton for delivery up to end of June, 1937, delivered in 6-ton lots to farmer's nearest station.

Coal Tar Products

ACID, CRESYLIC.—97/99%, 3s. 1d. to 3s. 2d. per gal.; 99/100%, 3s. 6d. to 4s. per gal., according to specification; pale 98%, 3s. 2d. to 3s. 3d.; dark, 2s. 9d. to 2s. 10d. GLASGOW: Pale, 99/100%, 3s. to 3s. 6d. per gal.; pale, 97/99%, 2s. 6d. to 2s. 9d.; dark, 97/99%, 2s. 5d. to 2s. 8d.; high boiling acids, 1s. 8d. to 2s.; American specification, 2s. 9d. to 3s.

ACID, CARBOLIC.—Crystals, 6¾d. to 7½d. per lb.; crude, 60's, 2s. 7d. to 2s. 9d. per gal. MANCHESTER: Crystals, 6¾d. per lb.; crude, 2s. 8d. to 2s. 9d. per gal. GLASGOW: Crude, 60's, 2s. 6d. to 2s. 9d. per gal.; distilled, 60's, 2s. 9d. to 3s. 3d.

BENZOL.—At works, crude, 8½d. to 9d. per gal.; standard motor 1s. 2d. to 1s. 2½d.; 90%, 1s. 3d. to 1s. 3½d.; pure, 1s. 7d. to 1s. 7½d. LONDON: Motor, 1s. 3½d. GLASGOW: Crude, 9d. to 10d. per gal.; motor, 1s. 2d. to 1s. 3d.

CREOSOTE.—B.S.I. Specification standard, 5½d. per gal. f.o.r. Home, 3¾d. d/d. LONDON: 4½d. f.o.r. North: 5d. London. MANCHESTER: 4¾d. to 5¼d. GLASGOW: B.S.I. Specification 5d. to 5½d. per gal.; washed oil, 4¼d. to 4¾d.; lower sp. gr. oils, 4¾d. to 5d.

NAPHTHA.—Solvent, 90/160%, 1s. 5½d. to 1s. 6½d. per gal.; 95/160%, 1s. 7d.; 90%, 1s. to 1s. 2d. LONDON: Solvent, 1s. 3½d. to 1s. 4d.; heavy, 11d. to 1s. 0½d. f.o.r. GLASGOW: Crude, 5½d. to 6d. per gal.; 90% 160, 1s. 4½d. to 1s. 5½d.; 90% 190, 1s. to 1s. 1d.

NAPHTHALENE.—Crude, whizzed or hot pressed, £12 to £13 per ton; purified crystals, £20 per ton in 2-cwt. bags. LONDON: Fire lighter quality, £5 to £5 10s. per ton; crystals, £27 to £27 10s. GLASGOW: Fire lighter, crude, £7 to £8 per ton (bags free).

PYRIDINE.—90/140%, 7s. to 9s. per gal.; 90/180, 2s. 3d. GLASGOW: 90% 140, 7s. to 8s. per gal.; 90% 160, 5s. to 6s.; 90% 180, 2s. 6d.

TOLUOL.—90%, 1s. 11d. to 2s. per gal.; pure, 2s. 3d. to 2s. 4d. GLASGOW: 90% 120, 1s. 10d. to 1s. 11d. per gal.

PITCH.—Medium, soft, 35s. per ton, in bulk at makers' works. MANCHESTER: 30s. to 32s. 6d. f.o.b., East Coast. GLASGOW: f.o.b. Glasgow, 30s. to 35s. per ton; in bulk for home trade, 32s. 6d.

XYLOL.—Commercial, 2s. 1d. per gal.; pure, 2s. 3d. GLASGOW: Commercial, 1s. 11d. to 2s. per gal.

Wood Distillation Products

ACETATE OF LIME.—Brown, £8 10s. to £9 per ton; grey, £10 10s. to £11. Liquor, brown, 30° Tw., 6d. to 8d. per gal. MANCHESTER: Brown, £9 10s.; grey, £11 10s.

CHARCOAL.—£5 5s. to £10 per ton, according to grade and locality.

METHYL ACETONE.—40-50%, £45 to £48 per ton.

WOOD CREOSOTE.—Unrefined 6d. to 1s. 6d. per gal., according to boiling range.

WOOD, NAPHTHA, MISCIBLE.—2s. 9d. to 3s. 3d. per gal.; solvent, 3s. 6d. to 3s. 9d. per gal.

WOOD TAR.—£2 to £3 per ton.

Intermediates and Dyes

ACID, BENZOIC, 1914 B.P. (ex toluol).—1s. 9½d. per lb. d/d buyer's works.

ACID, GAMMA.—Spot, 4s. per lb. 100% d/d buyer's works.

ACID, H.—Spot, 2s. 4½d. per lb. 100% d/d buyer's works.

ACID NAPHTHIONIC.—1s. 8d. per lb.

ACID, NEVILLE AND WINTHER.—Spot, 3s. per lb. 100%.

ACID, SULPHANILIC.—Spot, 8d. per lb. 100%, d/d buyer's works.

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZIDINE, HCl.—2s. 5d. per lb., 100% as base, in casks.

o-CRESOL 30/31° C.—6½d. to 7½d. per lb. in 1-ton lots.

p-CRESOL 34-5° C.—1s. 7d. to 1s. 8d. per lb. in ton lots.

m-CRESOL 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.

DICHLORANILINE.—1s. 11½d. to 2s. 3d. per lb.

DIMETHYLANILINE.—Spot, 1s. 6d. per lb., package extra.

DINITROBENZENE.—8d. per lb.

DINITROTOLUENE.—48/50° C., 9d. per lb.; 66/68° C., 10½d.

DINITROCHLORBENZENE, SOLID.—£72 per ton.

DIPHENYLAMINE.—Spot, 2s. per lb., d/d buyer's works.

α-NAPHTHOL.—Spot, 2s. 4d. per lb., d/d buyer's works.

β-NAPHTHOL.—In bags, £88 15s. per ton; in casks, £89 15s.

α-NAPHTHYLAMINE.—Lumps, 1s. per lb.; ground, 1s. 0½d.

β-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb., d/d buyer's works in casks.

o-NITRANILINE.—3s. 11d. per lb.

m-NITRANILINE.—Spot, 2s. 7d. per lb., d/d buyer's works.

Latest Oil Prices

LONDON, Nov. 4.—LINSEED OIL was steady. Spot, £26 15s. per ton (small quantities); Nov. to May/Aug., £24 5s.; Sept.-Dec., £24 7s. 6d., naked. SOYA BEAN OIL was slow. Oriental (bulk), spot, ex tank, Rotterdam, £24 15s. per ton. RAPE OIL was inactive. Crude, extracted, £33 10s. per ton; technical refined, £34 10s., naked, ex wharf. COTTON OIL was quiet. Egyptian crude, £26 10s. per ton; refined common edible, £29 10s.; and deodorised, £31 10s., naked, ex mill (small lots £1 10s.. TURPENTINE was steady. American, spot, 38s. 9d. per cwt.

HULL.—LINSEED OIL.—Spot quoted £24 15s. per ton; Nov.-Dec., Jan.-April, and May-Aug., £24 5s. COTTON OIL.—Egyptian crude, spot, £26 per ton; edible, refined, spot, £28 10s.; technical, spot, £28 10s.; deodorised, £30 10s., naked. PALM KERNEL OIL.—Crude, f.m.q., spot, £26 per ton, naked. GROUNDNUT OIL.—Extracted, spot, £34 per ton; deodorised £37. RAPE OIL.—Extracted, spot, £33 per ton; refined, £34. SOYA OIL.—Extracted, spot, £29 10s. per ton; deodorised, £32 10s. COD OIL.—F.o.r. or f.a.s., 25s. per cwt., in barrels. CASTOR OIL.—Pharmaceutical, 43s. per cwt.; first, 38s.; second, 36s. TURPENTINE.—American, spot, 41s. per cwt.

From Week to Week

OLD STUDENTS of Finsbury Technical College who desire to attend the 19th Streatfeild Memorial Lecture by Professor John Read on "A Chapter in the Chemistry of Essential Oils," should apply for tickets to the secretary of the Old Students' Association, Mr. F. R. C. Rouse, 15 Clifton Gardens, Golders Green, N.W.11.

REPRESENTATIONS HAVE BEEN MADE to the Board of Trade under Section 10 (5) of the Finance Act, 1926, regarding the exemption of cetyl alcohol from key industry duty. Any communication should be addressed to the Principal Assistant Secretary, Industries and Manufactures Department, Board of Trade, Great George Street, S.W.1, not later than November 29.

THE OCTOBER ISSUE of the "Journal and Proceedings" of the Institute of Chemistry contains an article by Mr. E. C. Barton, chairman of the Decimal Association, appealing to chemists to support the effort which is now being made by the Association to secure metric reform. It is published with a view to eliciting the views of Fellows and Associates, to whom it is especially addressed.

THE BRITISH ROAD FEDERATION, which represents 38 national organisations (including the Association of British Chemical Manufacturers), has been reorganised in order to extend and enlarge its work. A full-time secretary has been appointed and larger offices have been obtained at 120 Pall Mall, London. The first number of a new monthly bulletin of road information was published on Monday.

A GENERAL DISCUSSION on the subject of a certificate for full members of the British Association of Chemists took place at a meeting of the Liverpool Section on October 28, when the chairman, Mr. G. C. Riley, presided. The meeting passed a resolution strongly supporting the recommendation that a certificate should be issued to full members, and suggesting that if such a certificate was to be issued it should contain wording to the effect that the holder had satisfied the qualifications necessary for full membership.

ITALY HAS PLACED AT SHEFFIELD what is believed to be the biggest engineering contract from that source since the removal of sanctions. The contract, which is valued at over £100,000, and will occupy more than a year, is for the supply of forged steel high pressure hydrogenation vessels for petrol production. The recipients of the contract are the English Steel Corporation, Ltd., who, in view of the urgency of delivery, have invited the co-operation of Thomas Firth and John Brown, Ltd., steelmakers and engineers, Sheffield. The work ensures further steady employment for some hundreds of men already engaged at plants running at high capacity.

ELECTRON DIFFRACTION AND SURFACE STRUCTURE formed the subject of an address by Professor G. I. Finch, of the Imperial College of Science and Technology, to the members of the Liverpool Section of the Chemical Society, at Liverpool University on October 30. Professor Finch said that ordinary light was useless for the study of "laterous" rotation, and it was therefore necessary to use X-rays, having a wave-length of a suitable order of magnitude. After describing the wave-length theory of De Gruit in regard to the properties of atoms and the subsequent confirmation by G. P. Thomson, he described the methods used in the study of surface structure.

STOCKHOLM UNIVERSITY HAS RECEIVED A MONETARY GIFT from the Wallenberg Foundation to be used for erection of an institute for research in organic chemistry. The amount of the donation is 434,300 kronor (£23,900) and for equipment an amount of at least 50,000 kronor (£2,750) is to come from the Rockefeller Institute. A condition of the donation is that the university provides the site for the institute building and arranges for covering the cost of water, gas, electricity, and heating. For this purpose the university authorities have appealed to the city of Stockholm. In their appeal it is pointed out that the new institute will enable a much desired co-operation between industry and chemical research to be realised, as found in Great Britain, Germany and Switzerland.

SPEAKING AT THE 21ST ANNUAL MEETING of United Dairies, Ltd., in London, on October 30, Mr. J. H. Maggs, chairman, said the company's central research and control laboratories at Shepherd's Bush, which were opened about 18 months ago, were working smoothly and proving of great benefit to the company. Under the general control of the research advisory council, for whose disinterested guidance he could never be sufficiently grateful, the activities of their laboratory section had been continued and expanded. New tests, either devised by themselves or proposed by others, were continually being tried out with the object of improving the scientific control of their products. For instance, in spite of considerable scientific difficulties, they were slowly but surely improving the quality of the raw milk supplied to them by means of a test worked out in their own laboratories. They had also recently adopted a test worked out by the Dairy Research Institute at Reading which enabled them to check the efficiency of their pasteurisation plant.

AN ADDITIONAL OPEN-HEARTH FURNACE is being put in gas at the Clydesdale Steel Works of Stewart and Lloyds in Lanarkshire, making four active units at the plant.

THE BRITISH STANDARDS INSTITUTION has just issued a British Standard Specification (No. 614—1936) for graduated receivers for Dean and Stark apparatus. This apparatus is used for the determination of water in a variety of substances such, for example, as petroleum and petroleum products, tars and tar distillates, paints, etc. The specification is concerned solely with the graduated receiver of the apparatus.

THE MANCHESTER CHEMICAL SOCIETIES' JOINT ADVISORY COMMITTEE has issued a circular regarding the formation of the "Manchester Chemical Club" to all the societies represented on the local joint advisory committee. Dr. Herbert Levinstein has been elected the first president of the club; Messrs. G. A. Campbell, R. H. Clayton, W. H. Cowburn, and C. J. T. Cronshaw, Professor I. M. Heilbron, Major J. H. Mandleberg, Dr. Robert H. Pickard, and Dr. A. Schedler have been elected vice-presidents. The club is to provide a centre for the holding of meetings which, for the present, will take place at the Constitutional Club, St. Ann's Street, where also other club facilities will be available to members for an annual subscription of £1. The inauguration of the club is expected to take place within the next few weeks.

THE TREASURY, on the recommendation of the Import Duties Advisory Committee, has issued the Import Duties (Exemptions) (No. 7) Order, 1936, which modifies the scope of the present free list heading in respect of certain potassium salts, and took effect from October 30, 1936. The committee explains in its report that on occasion it has been found difficult to show that consignments of goods entered under the existing heading as "other mineral potassium fertiliser salts" in fact consist wholly of unprocessed minerals. The limitation imposed by the word "mineral" is removed in the modified definition which reads "potassium carbonate; potassium chloride; potassium sulphate; kainite and other potassium fertiliser salts (not including potassium nitrate) whether mineral or not." The committee states that the adoption of the new heading will facilitate administration and will not adversely affect any home manufacturing interest.

Company News

International Nickel Co.—The quarterly dividend has been raised from 35c. to 40c.

Lewis Berger & Sons.—A final dividend on the ordinary shares of 10 per cent. actual, less tax, has been recommended for the year ended July 31, 1936, making 16 per cent. actual, less tax, for the year. This final dividend compares with 9 per cent. for last year and the total for the year is 16 per cent., against 15 per cent. for the preceding year and 10 per cent. for 1933-34.

British Oxygen Co.—The interim dividend on the ordinry stock has been maintained at 7 per cent., or 1s. 4.8d. per £1 unit, less tax, on account of the year ending December 31, 1936. Last year's interim dividend was followed by a capital bonus of 28 4-7 per cent., and the final dividend for 1935 was paid on the increased capital. The payment will be made on or after November 18 to shareholders registered at the close of business on November 3.

Titanine.—An interim of 7½ per cent., less tax, is announced in respect of initial period, commencing May 27, 1936, payable November 17 to holders registered November 3.

United Premier Oil and Cake.—An interim dividend of 4 per cent., less tax (same), but on slightly increased capital, is announced.

British Celanese.—Somewhat disappointing results are shown in the report for the year to June 27 last, though the volume of the company's production and sales show a further increase and constitute a new record. Trading profits, including interest and fees, were £48,636 lower at £2,310,784. Net profits, after providing for all expenses, depreciation, research, tax, etc., are £78,630 down at £364,508. The report points out that were it not for a substantial increase in research charges and also expenditure in connection with the introduction and development of new processes, the balance of profit would have been in excess of the previous year. Payment was made during the year of three years' dividend on the first preference shares, thus clearing arrears. The carry-forward at June 27, 1936, is £302,325, against £260,692. Since the close of the accounts he half-year's dividend due on first preference shares—including the 500,000 shares issued during the year—has been paid. A start is now to be made in dealing with the six years' arrears on the 7½ per cent. second preference shares. A payment of a half-year's dividend on these shares is declared, payable on December 15, thus bringing the dividend up to October 31, 1930.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

(NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

ENGLAND, HUGHES, BELL AND CO., LTD., Padgate, paint and varnish manufacturers. (M., 7/11/36.) October 22, £3,100 and all moneys, etc., charge, to District Bank, Ltd.; charged on New Eccles Rubber Works and 5 and 6 Stanley Avenue, Eccles. *£3,000. March 17, 1936.

TETT BROTHERS, LTD., London, S.W., water softener manufacturers, etc. (M., 7/11/36.) October 27. £250 debenture, to F. F. Charlton, Dormans Park; general charge. *£2,500. December 31, 1935.

Receiverships

SCOLITE, LTD., manufacturers of synthetic resin products, etc., 21 Broadwater Road, Welwyn Garden City. S. G. Hillyer, of Finsbury Circus House, Blomfield Square, E.C.2, was appointed receiver on October 23, 1936, under powers contained in debentures dated December 7, 1934.

County Court Judgments

(NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court Judgments against him.)

MCKINLAY, HAROLD GEO., The Kennels, Shinfield Green, near Reading, laboratory assistant. (C.C., 7/11/36.) £30 15s. 2d. September 28.

TOFT, H. A. (male), 48 London Road, New Balderton, analytical chemist. (C.C., 7/11/36.) £10 6s. 6d. October 2.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Finland.—A firm in Helsingfors wishes to establish a connection with a United Kingdom exporter of heavy chemicals, including sodium sulphate and carbonate, etc. (Ref. No. 420.)

New Companies Registered

Stalwarts (Great Britain), Ltd., 174 Corporation Street, Birmingham, 4.—Registered October 28. Nominal capital £5,000. Engineers and contractors for the conditioning and reconditioning of water mains, pipes, tanks and reservoirs; manufacturing research and wholesale and retail chemists, etc. Directors: Albert F. Hodgkins and John Kendal Ward.

Walterisation, Ltd., Lloyds Bank Chambers, Sutton, Surrey.—Registered October 30. Nominal capital, £1,000. Manufacturers under licence of a patent compound for preventing rust; chemical depositors, platers, manufacturing chemists and druggists, etc. Directors: Wm. I. Walters, Edward A. Walters, and Cyssie G. Walters.

Hyganic, Ltd.—Registered November 2. Nominal capital £32,000. Manufacturers of preparations for enrichment of the soil and animal feeding stuffs of all kinds, and of aids and remedies of all kinds for agricultural fruit growing or other purposes or as remedies for men or animals, whether produced from vegetable or animal matter or by a chemical process; manufacturers of foods and feeding and fattening preparations of all kinds for farm live stock, dogs and poultry, etc. Subscribers: Ronald Tilbury, 36-8 Cornhill, E.C.3, and T. Rowley.

Forthcoming Events

LONDON.

Nov. 9.—Institution of the Rubber Industry. (London and District Section). "Ebonite for Use at Radio Frequencies." Dr. H. A. Daynes, B. D. Porritt and Dr. J. R. Scott. "The Falling Weight Impact Test for Ebonite." H. F. Church and Dr. H. A. Daynes. "The Behaviour of Ebonite Towards Organic Liquids." Dr. J. R. Scott. 7.30 p.m. British Empire Club, 12 St. James's Square, London.

Nov. 10.—Society of Chemical Industry (Road and Building Materials Group). "The Applications of Aluminous Cement and its Influence on Concrete Construction." A. V. Hussey. 8 p.m. Rooms of the Chemical Society, Burlington House, London.

Nov. 10.—Pharmaceutical Society of Great Britain. "Industrial Toxicology of To-day." (Lantern slides). Donald Hunter. 8.30 p.m. 17 Bloomsbury Square, London.

Nov. 11.—Institute of Physics. "Physics and the Detection of Crime." L. C. Nickolls. 8 p.m. Metropolitan Police Laboratory, Hendon, London.

Nov. 11.—Institute of Vitreous Enamellers (Southern Section). "Elements of Costing with particular reference to Vitreous Enamelling." J. Pedder. 8 p.m. British Industries House, Marble Arch, London.

Nov. 12.—British Science Guild. "Science in Development." Lord Rutherford. 4.30 p.m. Goldsmiths' Hall, Foster Lane, London.

Nov. 12.—Institute of Fuel. "Applications of Practical Thermodynamics." Dr. J. S. Clarke. 6 p.m. Meeting Room of the Chemical Society, Burlington House, Piccadilly, London.

Nov. 12.—Institute of Metals (London Local Section). "Research in the Iron and Steel Industry." W. H. Hatfield. 8 p.m. Royal School of Mines, South Kensington.

Nov. 12.—Institute of the Plastics Industry. (London and District Section). "Non-Metallic Bearings from Moulded and Laminated Plastics." G. R. Eyssen. B.I.H. Club, London.

Nov. 13.—Physical Society. Ordinary Meeting. 5 p.m. Imperial College of Science and Technology, South Kensington.

Nov. 13.—Society of Chemical Industry. (London Section, Chemical Engineering Group and Plastics Group). "Refractory Materials." Dr. J. W. Mellor and A. T. Green. 6 p.m. Institution of Civil Engineers, Great George Street, Westminster.

Nov. 13.—British Association of Refrigeration. Dance. 8 p.m. Small Queen's Hall, Langham Place, London.

BIRMINGHAM.

Nov. 11.—Institute of the Plastics Industry. (Birmingham Section). Dance. Botanical Gardens, Edgbaston, Birmingham.

GLASGOW.

Nov. 9.—Institute of Metals. (Scottish Local Section). "The Nickel Industry—Some Recollections." W. R. Barclay. 7.30 p.m. Institute of Engineers and Shipbuilders in Scotland, 39 Elmbank Crescent, Glasgow.

LIVERPOOL.

Nov. 13.—British Association of Chemists. (Liverpool Section). "Some Principles of Protection in Air Raids." Col. Garforth. 7.30 p.m. Liverpool University, Liverpool.

MANCHESTER.

Nov. 12.—Institute of Vitreous Enamellers. (Northern Section). "Developments of Airless Shot Blasting." H. Boardman. 7.30 p.m. Queen's Hotel, Manchester.

Nov. 13.—Oil and Colour Chemists' Association. (Manchester Section). "Shellac." A. F. Suter. Reynolds Hall, Manchester College of Technology, Sackville Street, Manchester.

NEWCASTLE-UPON-TYNE.

Nov. 10.—Institute of Metals. (North-East Coast Local Section). "Spectrographic Analysis of Metals." M. Milbourn. 7.30 p.m. Electrical Engineering Lecture Theatre, Armstrong College, Newcastle-upon-Tyne.

NOTTINGHAM.

Nov. 13.—Chemical Society. (Nottingham Section). Joint Meeting with Nottingham University College Physical and Chemical Society. "Resonance in Organic Chemistry." Professor N. V. Sidgwick. 5.30 p.m. Chemistry Theatre of the University College, University Park, Nottingham.

SHEFFIELD.

Nov. 13.—Institute of Metals. (Sheffield Local Section). "Lead Mining in Derbyshire." L. B. Williams. 7.30 p.m. Non-Ferrous Section of the Applied Science Department of the University, St. George's Square, Sheffield.

STOKE-ON-TRENT.

Nov. 9.—Ceramic Society. (Pottery Section). "The Art of Filtration, with Special Reference to Pottery Filter Presses." E. A. Alliott. 7.30 p.m. North Staffordshire Technical College, Stoke-on-Trent.

SWANSEA.

Nov. 10.—Institute of Metals. (Swansea Local Section). "Gases and Metals." C. J. Smithells. 6.30 p.m. Y.M.C.A., Swansea.

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